May 1945

Chemical Industries

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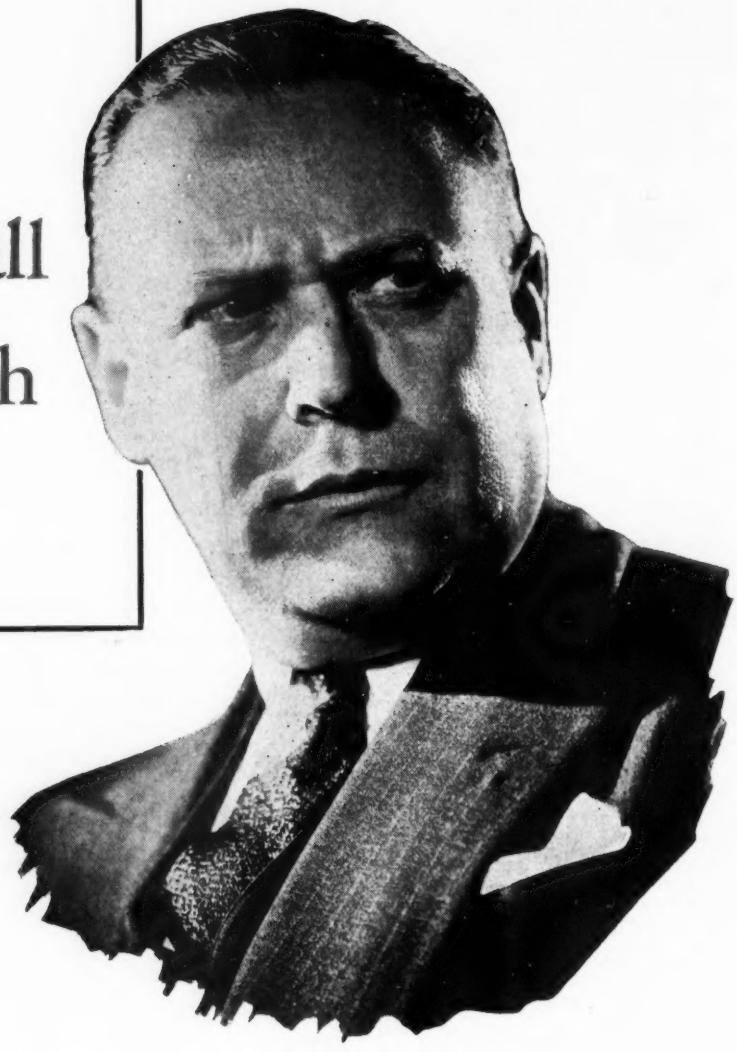
Westvaco CHEMICALS

"what! you mean I can't buy all the Soda Ash I want?"



YES, MR. INDUSTRIALIST, that's the situation on Soda Ash . . . as long as present heavy war demand continues.

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Yes, Mr. Industrialist, if they ever start pinning medals on industrial products for valiant war service, Soda Ash will sport a chest full! Think of that if you haven't been able to buy all the Soda Ash you want!

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THE CHEMICAL BUSINESS MAGAZINE

Chemical Industries

VOLUME 56
NUMBER 5

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THE READER WRITES

Chemical Patriarch

To the Editor of Chemical Industries:

The writer wants to nominate as his candidate for the oldest active chemical man in the United States, and one who has been continuously active in the chemical business for a longer period than any other living person, a resident of the good old chemical center of Philadelphia.

George Stanley James is my candidate. He was born in Philadelphia on November 24th, 1852, a mere 93 years ago. Mr. James graduated from the old Philadelphia High School, now Central High, as one of 35 out of an entering class of 140. He immediately obtained employment with a naval stores and chemical concern in Philadelphia named Prentice & Fitler. After a year or two he moved to another naval stores firm, John F. Lee & Company, and this latter concern going out of business, he joined Edward H. Rowley, also in the same line.

George S. James

Having made many friends in the leather trade, Mr. James decided that he would have a better opportunity selling neatsfoot oil and chemicals to the leather manufacturers, of whom there were a great number in Philadelphia. With this in mind he joined F. S. Walton Company, important manufacturers of neatsfoot and other animal oils.

After more than thirty years, the F. S. Walton Company was merged to form the present Reilly Whiteman & Walton Company, for whom Mr. James still acts as a Philadelphia representative. In addition, for the past fifty-five years he has acted as an independent chemical broker, and a successful one.

Mr. James has always had many interests outside of the chemical business. At 93 he is still a straight framed man about six feet tall, well set, and with an active mind. For years he was a noted oarsman and several times rowed in crews sent abroad. An enthusiastic member of the Vesper Boat Club, he served several terms as Vice-Commodore, and as its Naval Representative in the Schuylkill Navy of Philadelphia. Mr. James was a single and double sculler, too, and his pet grouch was that the mile races should be two miles.

A member of the Dickens' Fellowship, Mr. James knows every work and every character of that author, and is still considered an authority on Charles Dickens. He also is a student of Grecian and Roman mythology and has always, until a recent impairment of his vision, been an omnivorous reader.

The writer recently had luncheon with Mr. James and inquired as a novice of only 53 years in the chemical business, what his philosophy of life was. He replied, "I smoke all the cigars I can get, drink all the liquor I can get, do everything they say I shouldn't do, and worry about nothing."

Not so long ago two bandits followed Mr. James up on his front porch when he was returning home late one night. They beat him up pretty badly, but afterwards his greatest regret was that the one who stole his watch was the one who got away.

If anyone has a qualifying candidate to match this grand old man, George James, I would be pleased to hear of him.

ALEX. C. FERGUSSON,
Alex. C. Fergusson Co.
Philadelphia, Pa.

Research Article One of Best

To the Editor of Chemical Industries:

Dr. E. C. Williams' article on page 397 of the March 1945 issue of CHEMICAL INDUSTRIES "Research Management and Its Relationship to other Chemical Company Functions" was one of the best articles of this type that has come to the writer's attention. We hope that you will find it possible to supply us with reprints of this article.

CLYDE R. HUTCHCROFT
Research Department,
Keasbey & Mattison Co.,
Ambler, Pa.

Dr. Williams' excellent paper has attracted more attention than almost anything else that has appeared in CHEMICAL INDUSTRIES *in the past couple of years. There are a few more reprints available and it's first come first served.*—EDITOR.

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Among the pioneers who did much to develop chromium as an important industrial chemical was Isaac Tyson of Baltimore who, in 1845, laid the foundation of the present Mutual Chemical Company.

About forty years later Augustus Schultz determined the fundamental principles of two bath chrome tanning. This process was rapidly adopted, and was followed by the development of a one bath process.

Since that time interest in chromium chemicals has grown by leaps and bounds until today these compounds play a vital part in our war effort. Important applications include anodizing aluminum, chrome plating, metal cleaning and corrosion prevention. The manufacture of such pigments as zinc chromate and chrome oxide green occupies a high place in war time, while textile dyeing and wood preservation are other essential industries using chromium chemicals.

The history of Mutual is the chemical history of chromium in America.

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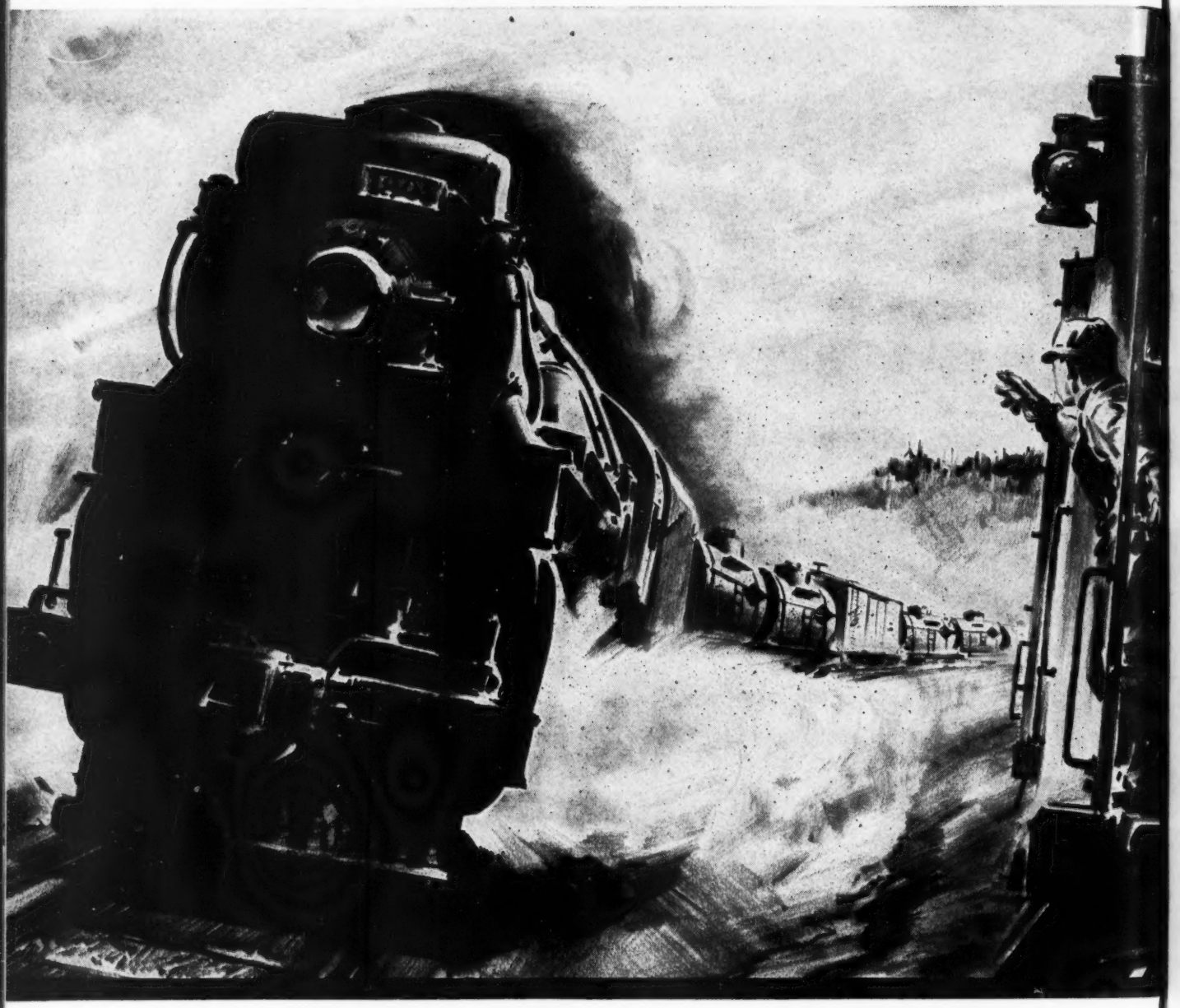

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CHEMICALS INDISPENSABLE TO INDUSTRY AND VICTORY

WASHINGTON

T. N. SANDIFER *reporting*

Nitrogen Plants • Alcohol Agreement • Technical Manpower Synthetic Rubber Comparison • Fertilizer Legislation

The Change in Administration

IT IS TOO EARLY TO ASSESS the full effect of the change in the Administration on domestic policies. While President Truman has pledged that overall policies of his predecessor would hold good, his approach is obviously on a different basis.

He is a former Senator, which is interpreted here to mean that Congressional reaction to current restrictions, war industry moves and reconversion plans, will get attention, as from one member to another, and not as from Congress to a President who has traveled a different route to the White House.

The general expectation, early in the unfolding of this change, is that a more down-to-earth viewpoint will be imparted to the Washington agencies, and, in the course of time, some faces will disappear from the Washington scene.

Domestic issues almost inevitably will get more consideration, for that is the new President's more natural preoccupation. This may have a bearing in the eventual scramble for a return to civilian production.

The new President has a much more detailed grasp of certain war production matters than would otherwise be the case, from his recent chairmanship of a Senate investigation of all war matters.

U. S. Pledges Chile To Scrap Government Nitrogen Plants

AT THE RECENT INTER-AMERICAN CONFERENCE at Mexico City, it is now learned officially, the United States made some very broad commitments to Chilean interests regarding the disposal of U. S.-owned nitrogen plants, after the war.

The Secretary of State is understood to have informed Chilean officials that it was not the intention of this Government that production by the Government of synthetic nitrogen in plants it owns and constructed for war purposes, should be continued beyond the time called for to meet war needs, except for stand-by purposes and for research and technological purposes.

The Secretary also informed the Chileans that the United States would consult with Chile in event it became necessary to modify this policy. He also said it was the intent of the United States to consult with Chile with respect to such Government plants for production of synthetic nitrogen constructed for war, if these were not converted or dismantled, and if their sale or lease to private interests might create "serious problems affecting the production or exportation of Chilean nitrates."

Cuban Alcohol Agreement

THE STATE DEPARTMENT AND CUBAN INDUSTRY and official agency heads have completed an agreement for purchase by the Foreign Economic Administration of 70,000,000 gallons of blackstrap molasses, at 13.6 cents f. o. b. Cuban ports, for production of industrial alcohol, and also for substantial quantities of 190 proof industrial alcohol at 65 cents per gallon. Cuban producers have contracted to ship a minimum of 20,500,000 gallons of industrial alcohol to the United States with an option to ship additional quantities up to 7,500,000 gallons.

American-owned Property Abroad

IN THE LIGHT OF THE WAR SITUATION, the Treasury has made an interesting statement. It shows that while foreign-owned property frozen in the United States totals $8,500,000,000, the value of American-owned property in foreign countries is $13,350,000,000 much of it under controls such as those now freezing the foreign properties held here. Also, there is more American-owned property in Germany than anywhere else abroad, totaling $1,290,000,000. In Japan, Americans own property valued at $90,000,000, but Japanese-owned assets in this country amount to $150,000,000.

Termination of hostilities in Germany will immediately open the question of accounting for the huge American stake there.

Technical Manpower Crisis

APPROACH OF WHAT IS NORMALLY GRADUATION WEEK in the nation's colleges points up the growing crisis in technical manpower reserves. One college reports that of its normal class of 100 members studying chemistry and sciences, it now has 1 girl, 2 IV-F's, and 2 men classed 1-A.

Rep. Gifford, of Massachusetts, stated in Congress

recently that many of the scientists engaged in Government activity in Washington have revealed their anxiety over the general situation, without reference to the immediate stringency in producing industries. They point out that other countries have followed a contrary policy of conserving their scientifically trained younger men, even increasing the number. The obvious result, these scientists contend, is that a decade from now, under peace-time competition, the countries with the trained men will inevitably enjoy advantages this country has lost.

Figures recently given to this member of Congress are that 85,000 chemists and chemical engineers are left in the country. As early as February, 1942, he recalled, technical organizations were protesting the taking of only 300 chemists and chemical engineers into the services, on the ground they were critically needed even at that early date in war production.

Missouri Valley Authority Funds Asked

THE PRESIDENT HAS ASKED APPROPRIATION of $4,480,000 for preparation of plans for development of the Missouri River Valley. The funds would provide only for drafting of plans and other such preliminaries. A part of this fund would be allocated to the Geological Survey for certain investigations within its field.

The actual development of a River Valley Authority, which it has been proposed would parallel TVA, is regarded here as some distance in the future. If the present funds are appropriated, it would not mean that any actual work on the development itself would take place.

A score or more of national associations are now in organized opposition to the establishment of more "TVA-type" river developments, as proposed in various pending bills.

Rubber Agency Changes

APPOINTMENT OF JOHN L. COLLYER as head of the War Production Board's various rubber programs has raised a question as to how much of a shift in direction is involved. Mr. Collyer, it is said, will serve as "special director" of these operations, and for only a period of months, for which he was borrowed from the rubber company of which he is executive head.

However, it is known that J. F. Clark, chief of the Office of Rubber Director, planned to leave, and had this plan for a long time. He said he would stay only until Mr. Collyer could gather up all the reins, but meanwhile, it is emphasized at Washington that Mr. Collyer was not brought in as a replacement. His job will be to gear all the various phases of the production plan toward the present goal of record proportions on heavy duty tires for war.

Fats for Soap

USE OF FATS AND OILS in manufacture of household package and bar soap for the second quarter beginning April 1, is expected to be 80 percent of use during the corresponding quarter of the 1940-41 base period, or about the same level as for February and March this year.

Meanwhile, the allocation of inspected and uninspected lard for soap manufacture last year is still the subject of Congressional criticism. Until the practice was halted last November, a total of 171,000,000 pounds was allocated for soap. Criticism was based on the loss of food entailed, as well as subsidization of substitute oils.

The President's Tariff Program

HEARINGS BEGAN APRIL 16 before the House Ways and Means Committee on the President's request for an extension of the Reciprocal Trade Act and authority to negotiate tariff cuts as deep as 50 percent of present rates.

It is expected, but not formally announced yet, that industry organizations will present an opposing brief, in effect suggesting that the Act be extended for one year, but authority to alter the rates to the extent desired by the President be deferred until the war situation has cleared.

Natural Gas Survey

HEARINGS ORIGINALLY SCHEDULED to begin May 1, in Kansas City, launching the Federal Power Commission investigation of the natural gas industry, have been deferred until late summer at least, and possibly early autumn. The indicated reason is that various organizations were unable to make proper preparation of testimony in the short time before the original hearing date.

Another reason appears to be that House and Senate bills specifically appropriating funds for this undertaking, and giving the Commission the Congressional blessing, are still making slow headway. The Commission has statutory authority for its plan in any case, but the inference appears to be that it would prefer to wait for Congressional action in view of the ramifications involved.

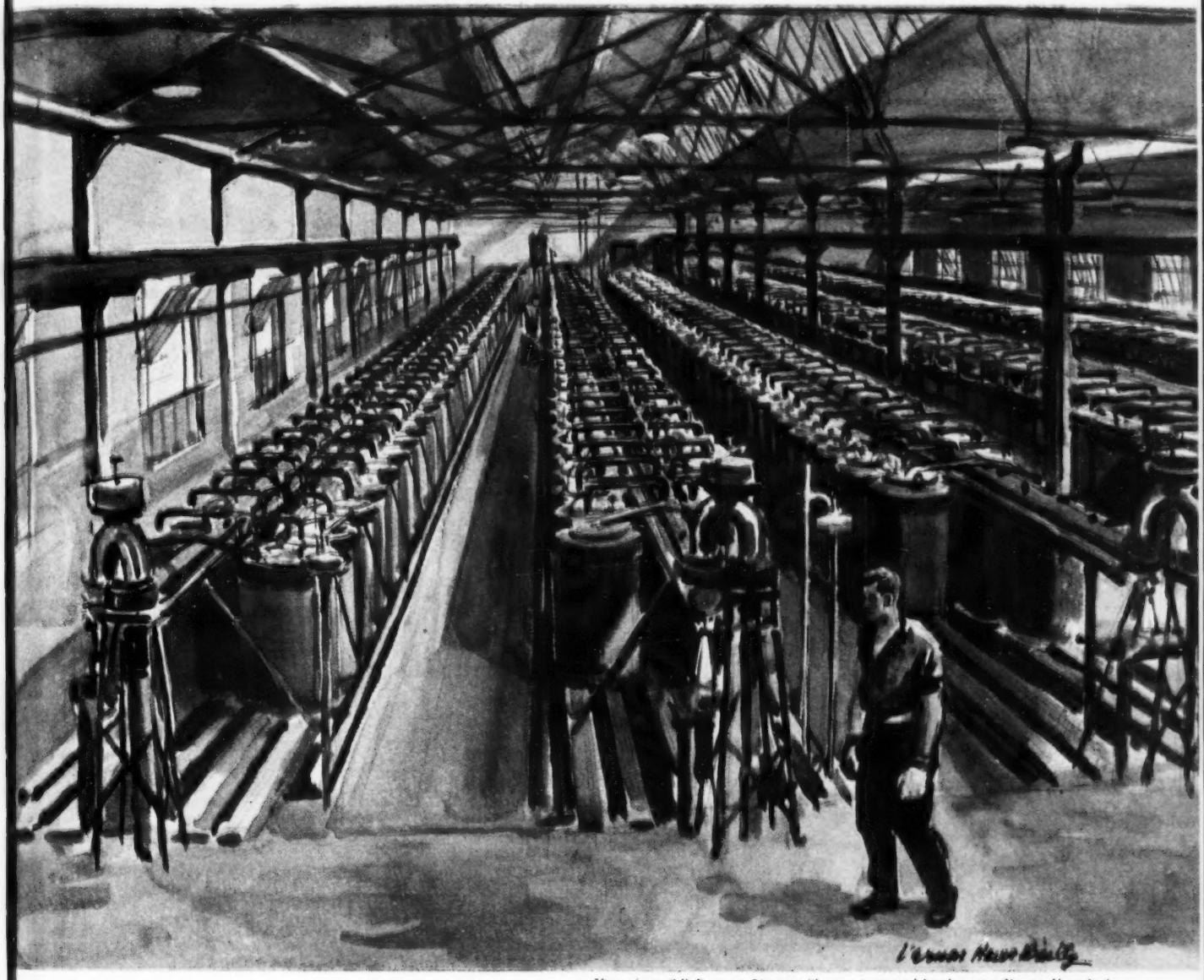
Research Board

SENATOR BYRD, DEM., VA., HAS INTRODUCED a bill which has been referred to the Senate Naval Affairs Committee, S.825, providing for a research board "for national security" with direct responsibility for keeping military inventions up to developments elsewhere.

New Fertilizer Legislation

A BILL IS REPORTED TO BE IN THE DRAFT STAGE, for submission to Congress by the American Farm Bureau, which would authorize a national fertilizer program. Highlights are stated to include proposed construction by the Government of three plants for production of concentrated phosphorous, one for production of potassium, and taking over of one nitrogen plant now producing nitrogen for munitions. Plants would be Government-operated, with a provision that they be sold to farmer cooperatives after five years.

A Constant Flow



View of one Cell Room at Niagara Plant as interpreted by the artist, Vernon Howe Bailey

TYPICAL of the modern facilities with which Niagara Alkali Company is maintaining a constant flow of electro-chemical products for use in war production is the array of liquid chlorine cells illustrated here. Such up-to-the-minute equipment plus the efficient methods of control over quality established by Niagara's pioneering chemists are responsible to a great extent for Niagara's reputation as a quality producer in this field of chemical manufacture. Niagara's products are the result of thirty-six years of specialization and their reliability represents the untiring efforts of an experienced staff devoted to quality production. Look to Niagara for reliable chemical service.

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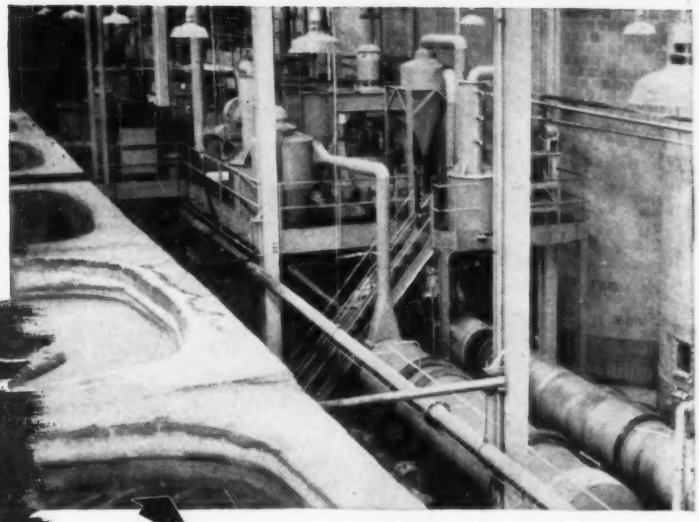

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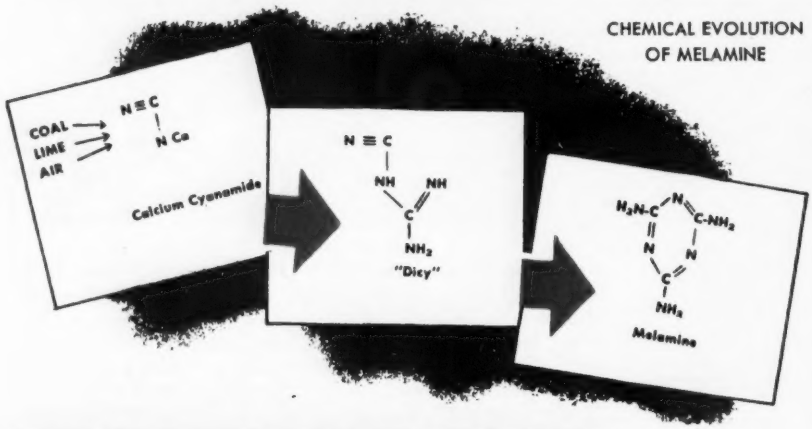


(*Above*) **PAPER AND PAPER BOARD** treated with PAREZ 607 and other melamine resins have new wet and dry strength, enabling paper to be used for many new and important purposes.

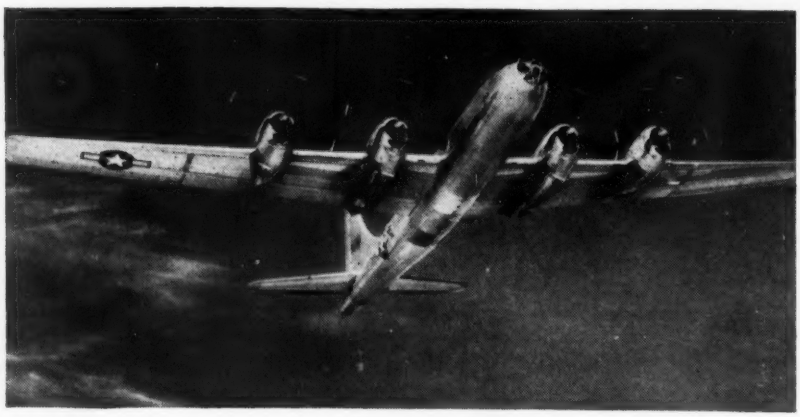
(*Above*) **MELMAC RESINS** for enamels, lacquers, paints, and varnishes, make possible surface coatings which are harder, more durable, and which retain their color and gloss longer.

MELAMINE MIRACLES FOR PAINT, PLASTICS, PAPER, TEXTILES, LEATHER AND WATER

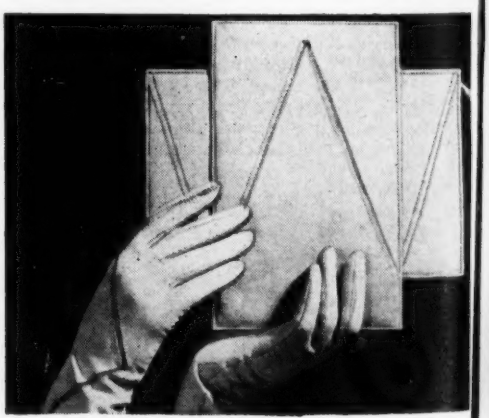
One of the most amazing chemical achievements of our time is the development of melamine . . . from a rare and little used chemical . . . to one that is now on every fighting front . . . and one that has set new standards for products in many industries.

After years of research and experimentation, Cyanamid began the production of melamine on a commercial scale in 1939. Today, Cyanamid is the largest producer of melamine in the world and provides America with her major source of supply.

In various compounds, melamine has performed miracles in many fields. In the form of plastics, Cyanamid's MELMAC* molding materials have opened new fields for plastics because of their unusual stability, heat and arc resistance, and dielectric strength. MELMAC resins have made possible faster baking enamels which are harder, more resistant and more durable. In the form of TANAK* MR and other melamine syntans, it has improved leather. PAREZ* 607 and other melamine resins have given new wet and dry strength to paper. LANASET* resin is the first product in use for satisfactory wool shrinkage control. IONAC** resins in Filt-R-Stil** equipment have made possible demineralized water for industry. PERMEL* resins have achieved spot proofing and water repellency for textiles, AEROTEX** M-3 resin crease proofing and fiber stabilization. The complete story of Cyanamid's melamine is now available in the booklet, "*Melamine . . . a Miracle Maker.*" A copy will be sent on request.



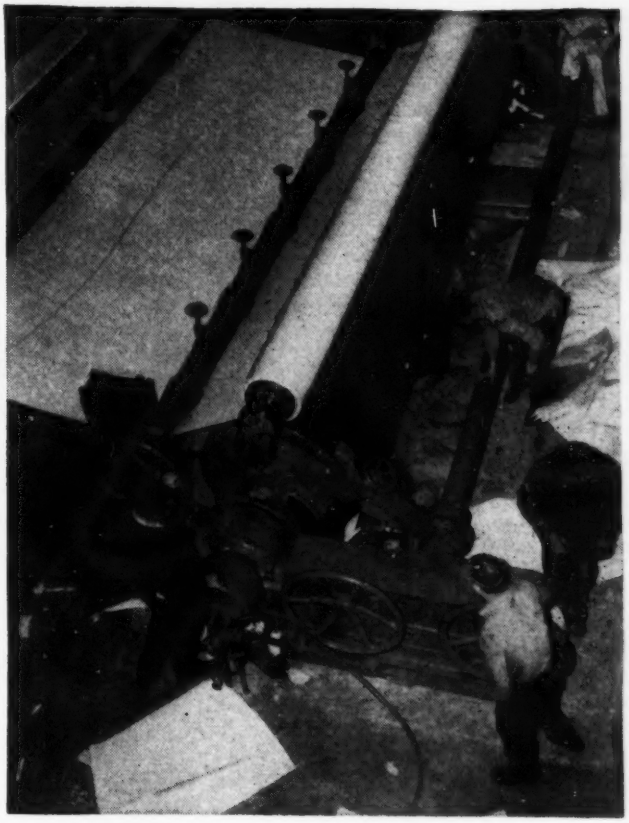
(*Above*) **MELMAC PLASTIC** parts, such as distributor heads, circuit breakers and relays, condenser housings, and harness parts make high altitude flying feasible.

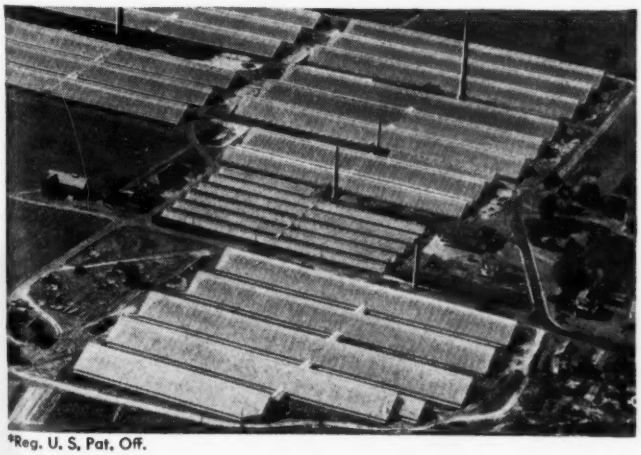


(*Above*) **WHITER LEATHER,** new fullness, and other tanning advantages are imparted by TANAK MR.

Chemical Newsfront

(*Above*) **ONE BITE OF THIS HUGE DRAGLINE** and 25 cubic yards of earth have been moved in this coal mining operation. In strip mining, the top layer of earth above the coal seam is loosened with high explosives. Often overburdens 50 feet deep, 80 feet long, and more than 200 feet across, are "shot" down and loosened into easily handled material in one multiple blast. A special line of industrial explosives, developed by Cyanamid for such operations, is one of the factors that has made possible the economical production of more than 65 million tons of coal in 1942 and over 76 million in 1943.





*Reg. U. S. Pat. Off.

(*Above*) **PAPERS WITH SUPERIOR WATER RESISTANCE,** increased pliability and improved printing qualities are now being produced through a "combination" sizing procedure using wax size with rosin size. Although the current shortage of critical rosin sizes has made this partial substitution of wax size necessary, in many grades it has resulted in improved paper quality. Cyanamid's ALWAX** and WAXINE* Sizes, used with rosin size, produce paper with superior water-resistant qualities, improved creasing, scoring, folding, and crimping qualities, and better printing qualities.

(*Left*) **KEEPING GREENHOUSES FREE OF INSECT PESTS** is a constant problem which has been successfully and economically solved by regular fumigation with Cyanamid's CYANOGAS* G-Fumigant. The L. B. Coddington Co., Inc., at Murray Hill, N. J., growers, hybridizers, and leading specialists in choice roses, have been using this insecticide since it was put on the market some 20 years ago. They report that through the regular use of CYANOGAS their stock is kept practically clean of thrip, aphis, and other insect pests.

**Trade-Mark

American Cyanamid & Chemical Corporation

A Unit of American Cyanamid Company

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Whatever his discovery may be—

General American will build a tank car to carry it

Your future plans may include new liquids and gases never shipped before — and needing bulk transportation to be profitable. Call on General American engineers.

Specially designed General American cars today carry highly volatile liquids, gases requiring extreme pressures, *acids that corrode ordinary cars.*

The correct car to carry your "problem product" efficiently can be designed and built by General American — world's largest operators of specialized tank cars.

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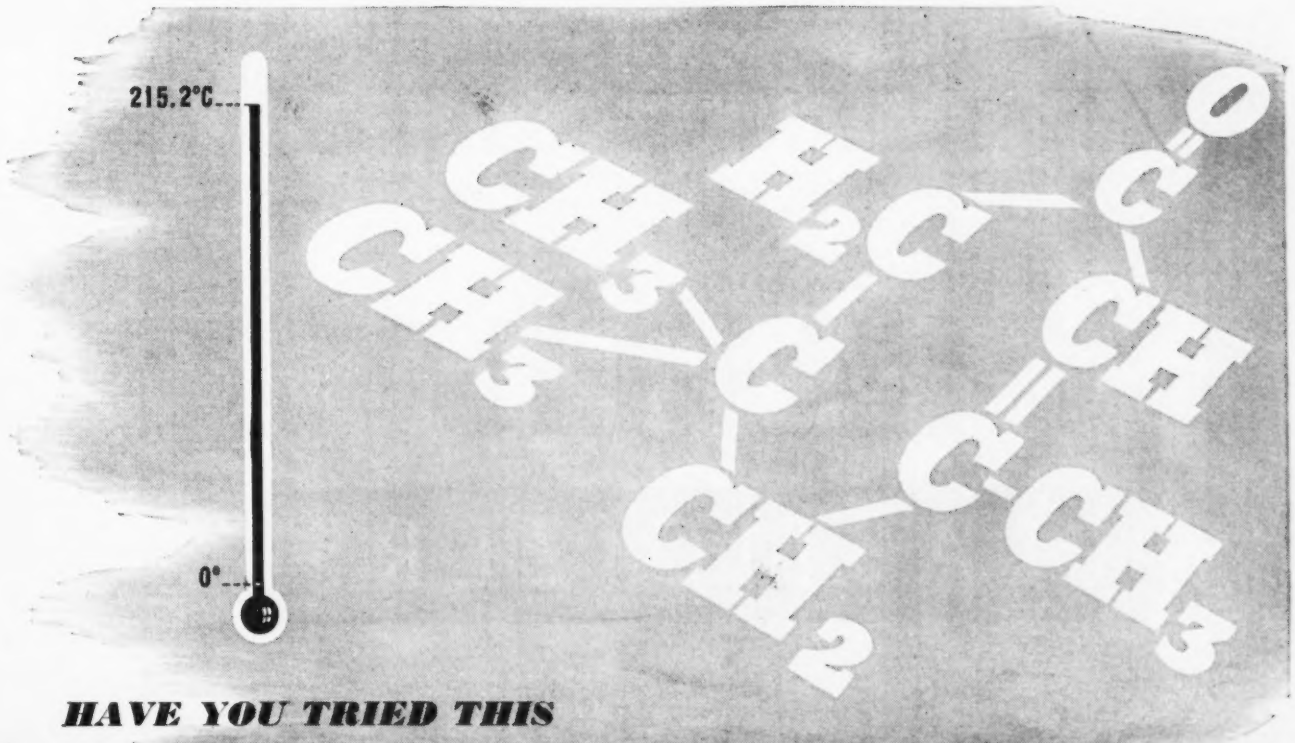

HAVE YOU TRIED THIS

Powerful High-Boiling Solvent?

ISOPHORONE

has high solvent power for "Vinylite" resins, cellulose esters, nitrocellulose, and cellulose ethers.

Spreading Agent

An addition of five per cent of isophorone increases spreading and wetting power of aromatic hydrocarbons.

Improves Spray Coatings

Five per cent of isophorone in lacquer thinners markedly improves the flow-out of sprayed coatings.

Low Vapor Pressure

Permits the formulation of many novel and improved types of inks, stencil pastes, and roll-coating finishes.

6.2 Dilution Ratio

The nitrocellulose dilution ratio of this useful ketone is among the highest known—6.2 for toluene.

"Vinylite" is a registered trade-mark.

PROPERTIES

Boiling point . . . 215.2°C. at 760 mm.
Vapor pressure . . . 0.3 mm. at 20°C.
Solubility in water . . . 1.2% at 20°C.
Solubility of water in . . . 4.3% at 20°C.
Flash point . . . . . 205°F.
Specific gravity 0.9229

For further information and prices (lowered Jan. 1) write for the technical data sheet "Isophorone," Form 5897.

Other ketones supplied in commercial quantities include Acetone, Methyl Acetone, Methyl Isobutyl Ketone, Methyl Amyl Ketone, Acetonylacetone, Pentanedione (Acetyl Acetone), Mesityl Oxide, and Diacetone Alcohol.

BUY UNITED STATES WAR BONDS & STAMPS

CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

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SYNTHETIC ORGANIC CHEMICALS

BAKER®

PLASTICIZERS

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Vinyl Resins

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Cellulose Resins

Melamine Resins

Styrene Resins

and

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Established 1857
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● BAKER PLASTICIZERS CONTAIN NO PHTHALATE

HANDLING+Processing+HANDLING+Assembling+HANDLING+Packing+HANDLING+Storage+HANDLING

HANDLING—the Common Denominator of PRODUCTION

LET MEN DIRECT POWER—NOT GENERATE IT!

Continuous production depends, in great measure, upon a smooth, constant flow of materials. When skilled labor is required to move materials manually, much of the efficiency of modern production machinery is wasted. An uncontrolled flow of material can slow down production, too little material can stop it.

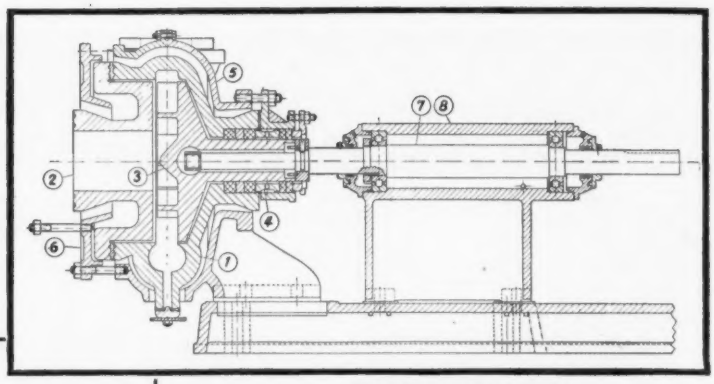
A modern, mechanized handling system is necessary to maintain production schedules. Towmotor, the *one-man-gang*, will provide an accurately controlled supply of material, in the right quantities, at the right time and place. The Towmotor DATA FILE tells the complete story—write for it today.

TOWMOTOR

THE ONE-MAN-GANG

TOWMOTOR CORPORATION • 1237 E. 152ND STREET, CLEVELAND 10, OHIO

PRESCRIPTION FOR PROCESSING



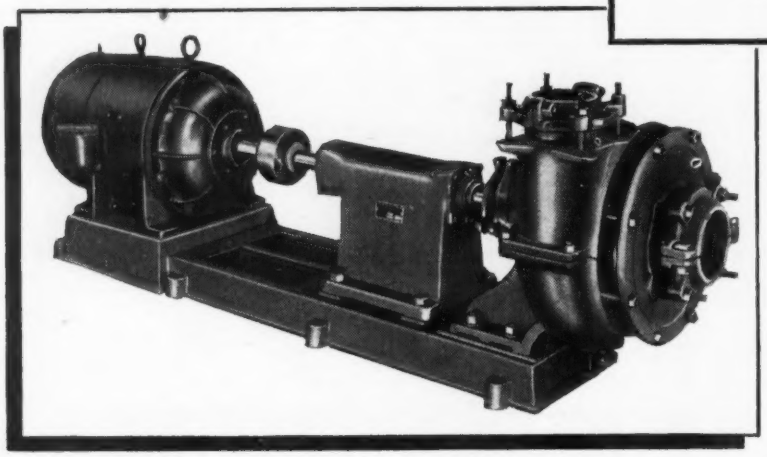


Fig. 423. *Direct Driven Long Coupled Centrifugal Pump.*

DESIGN FEATURES

1. Stoneware Volute
2. Stoneware Cover Plate
3. Stoneware Impeller
4. Water Sealed Stuffing Box
5. Cast Iron Armor for Volute
6. Cast Iron Armor for Cover Plate
7. Steel Shaft
8. Bearing Support

NOTE: Both direct motor drive and belt driven models are available.

Armored Stoneware Centrifugal Pumps

In specifying the equipment for a chemical plant one of the most important tasks facing the designing engineer is the choice of a pump which will withstand the ravages of the corrosive materials to be handled and will have the characteristics of good design which will insure trouble-free mechanical operation and freedom from breakage. Our prescription for this processing problem is a GENERAL CERAMIC'S ARMORED STONEWARE CENTRIFUGAL PUMP. The volute and impeller of this pump are constructed of chemical stoneware, precision ground to give close clearances and high efficiency. The stuffing box is equipped with a water seal to prevent excess leakage. Thus the entire "wet end" is not only corrosion resistant but corrosion "proof". To guard against mechanical shock and operating hazards the stoneware parts are encased in cast iron armor.

General Ceramic's pumps are successfully handling strong acids (except hydrofluoric), bleaching agents, and fine chemicals in processing plants throughout the world.

If you are pumping a corrosive liquid at capacities varying from 10 to 700 GPM with heads ranging up to 70′ there is a General Ceramic's pump that will perform your task with absolute freedom from corrosion and a minimum of maintenance expense. Send for Bulletin Number 211 describing and illustrating chemical stoneware pumps that will solve your pumping problems.

GENERAL CERAMICS AND STEATITE CORP. 7197

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GENERAL CERAMICS and STEATITE CORPORATION
Keasbey, N. J.
Insulator Division

CARILLON CERAMICS CORPORATION
Metuchen, N. J.
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The manufacturing facilities of these affiliates of GENERAL CERAMICS & STEATITE CORP. are available for handling ceramic problems in all branches of industry. GENERAL CERAMICS & STEATITE CORP. is thus able to offer a service covering all industrial applications of ceramic products.

adding a Plus
to your specifications...

STANDARD TECHNICAL SERVICE

helps you { CONSERVE MATERIALS
GET BETTER RESULTS

STANDARD Silicates

SILICATE OF SODA—Concrete Special
SILICATE OF SODA GLASS
LIQUID SILICATE OF SODA—All Grades
WATER WHITE GRADE 42
SODIUM METASILICATE
SODIUM ORTHOSILICATE
SODIUM SUPERSILICATE
ALKALATE METALATE ORTHOLATE

ALKALI

DIAMOND ALKALI COMPANY • Standard Silicate Division

Plants at CINCINNATI JERSEY CITY
LOCKPORT, N. Y. MARSEILLES, ILL.
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Acetone was the first product of Commercial Solvents Corporation. In fact, it was the urgent need for Acetone to make explosives that brought C.S.C. into being. Since World War I the industrial uses of Acetone have multiplied.

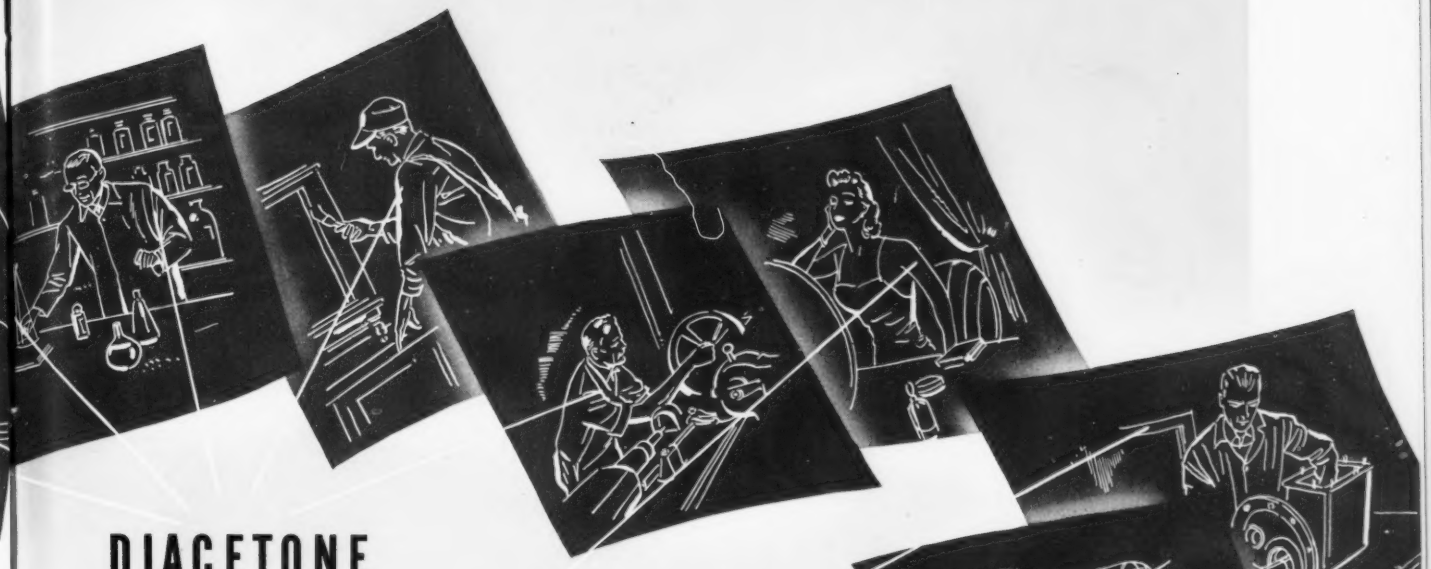
Today there are two important derivatives of C.S.C. Acetone which have also found numerous industrial uses —Diacetone and 2-Methyl-2,4-pentanediol, commonly known as "2-2-4."

ACETONE

ARTIFICIAL LEATHER
ARTIFICIAL SILK
BLENDED FUELS
CELLULOID
CEMENTS
CHLOROFORM
CONFECTION GLAZE
ENZYMES
EXPLOSIVES
IODOFORM
ISOPROPYL ALCOHOL
KETENE
LINIMENTS
PAINT REMOVERS
PERFUMES
POLISHES
SAFETY GLASS
SYNTHETIC RESINS
SYNTHETIC RUBBER

C.S.C. Acetone is a product of exceptional purity. It is used in making a wide variety of products . . . such as pharmaceuticals and drugs, acetylene solutions for shipment in cylinders; and as a solvent in special coatings and in the manufacture of synthetic fibers.

C.S.C. Acetone has become essential to industry because of its unusually strong solvent power, very high purity, unvarying uniformity and availability, at a reasonable price.



DIACETONE

ADHESIVES
BRAKE FLUID
CLEANERS AND REMOVERS
DRUGS
LACQUERS
PHOTO FILM AND REPRODUCTION PRODUCTS
PLASTICS
TEXTILES

Diacetone presents a versatile combination of useful properties. Its excellent solvent power for a great variety of substances and its complete miscibility with water and most common organic liquids make this slower-evaporating solvent particularly useful to industry. C.S.C. supplies Diacetone in both technical and acetone-free grades.

2-2-4

BRAKE FLUIDS
CUTTING OILS
DISINFECTANTS
DRY CLEANING SOAPS
DUPLICATOR FLUIDS
ELECTROLYTIC CONDENSERS
GLASS CLEANERS
GREASES AND LUBRICANTS
GRINDING ASSISTANTS
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PLASTICIZERS
PRINTING PASTES AND DYES
REACTION MEDIUM
SOLUBLE OILS
SURFACE-ACTIVE AGENTS
TEXTILE SOAPS
MORTICIAN'S SUPPLIES

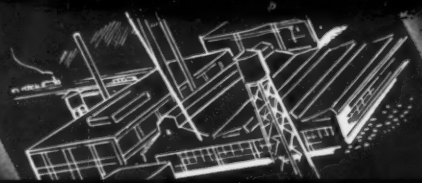
2-2-4 is a water-white, high-boiling liquid having the useful property of miscibility with an unusually large number of liquids of basically different chemical nature. This extensive miscibility, combined with its stability, makes it an exceptionally valuable solvent and blending agent.

2-2-4 is being used as a high-boiling solvent, penetrant and lubricant, mild humectant, and coupling agent in a wide variety of applications. Write for the new bulletin on 2-2-4.

COMMERCIAL SOLVENTS

Corporation

17 East 42nd Street, New York 17, N. Y.



Rigidly controlled particle size is one of the factors which make Isocel a more acceptable catalyst than plain aluminum chloride. The bauxite used in Isocel as the carrier for aluminum chloride is prepared to uniform particle size, and control is maintained throughout the manufacture of Isocel. The aluminum chloride is thus presented in a lower concentration per unit of reactant space, yet uniformly dispersed. Isocel may be used with very sensitive or very active compounds, where reaction with finely powdered $AlCl_3$ is too rapid or severe, and in processes where lump $AlCl_3$ produces complications.

An important use of Isocel today is the conversion of normal butane to isobutane for the enrichment of akylation feed stocks deficient in isobutane. Its value as an isomerization catalyst in refinery operations has been amply proved. Other reactions are constantly being studied. In many of them, the use of Isocel as a catalyst has unmistakable advantages, and it is safer to handle and less corrosive.

ISOCEL has a potential application in every field in which aluminum chloride is used as a catalyst. These seven fields are typical:

1. Reaction of organic halides with aromatic hydrocarbons.
2. Reaction of anhydrides of organic acids with aromatic hydrocarbons.
3. Reaction of oxygen, sulfur and sulfur dioxide with aromatic hydrocarbons.
4. Cracking of aliphatic and aromatic hydrocarbons.
5. Polymerization of unsaturated hydrocarbons.
6. Alkylation of aromatic hydrocarbons.
7. Isomerization of aliphatic hydrocarbons.

Our well-staffed laboratory and experienced engineers are available to help solve your special catalytic problems. Why not enlist their aid? There is no obligation. Write Attapulgus Clay Company (Sales Agent), 260 South Broad Street, Philadelphia 1, Pennsylvania.

POROCEL CORPORATION • BAUXITE ADSORBENTS AND CATALYSTS

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..a name to be remembered by *Post-War Planners*—

The W. C. HARDESTY COMPANY, makers of Red Oils, Stearic Acid, White Oleine, Fatty Acids and related products, is producing large quantities of its products to supply the wartime demands of consuming industries.

Prior to the war, consumers have periodically had to reformulate many of their products, because of shortages in foreign markets affecting the supply of raw materials, but we are now learning through scientific research to replace many of the raw materials supplied only from abroad.

With an eye to the future the HARDESTY plants and installations were designed to be *readily adaptable* for post-war usage when newly developed and specially processed products with unusual characteristics will be in demand.

If you are a potential consumer of any of the products made by HARDESTY and are planning now to meet future competition, it will pay you well to meet a HARDESTY representative today.

STEARIC ACID RED OIL GLYCERINE PITCH WHITE OLEINE

HYDROGENATED FATTY ACIDS ANIMAL AND VEGETABLE DISTILLED FATTY ACIDS

HARDESTY

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WHY NOT? . . . BUSINESS IS GOOD!
Z-Z-Z-

WHERE dark-colored molded or laminated plastics are in order, many fabricators can effect marked manufacturing economies and—even more important—appreciable savings in critical raw materials, by extending or modifying their compositions with Vinsol Resins. Phenolics, for example, have been successfully "stretched" 20 to 50 per cent. And Vinsol costs only 2½ to 3½ cents per pound delivered!

This high-melting thermoplastic is compatible with many natural and synthetic resins—rosin, shellac, glycerols, as well as phenolics. To many of these compounds it brings excellent electrical properties, hardness, resistance to oil, water, low cost.

Vinsol Resin is currently available in large quantities. Determine for yourself how it can save you money and materials by returning coupon for a generous free test sample and detailed properties.

HERCULES

RETURN COUPON FOR FREE SAMPLE

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Please send sample of Vinsol Resin and further details.
I am interested in this material for .....
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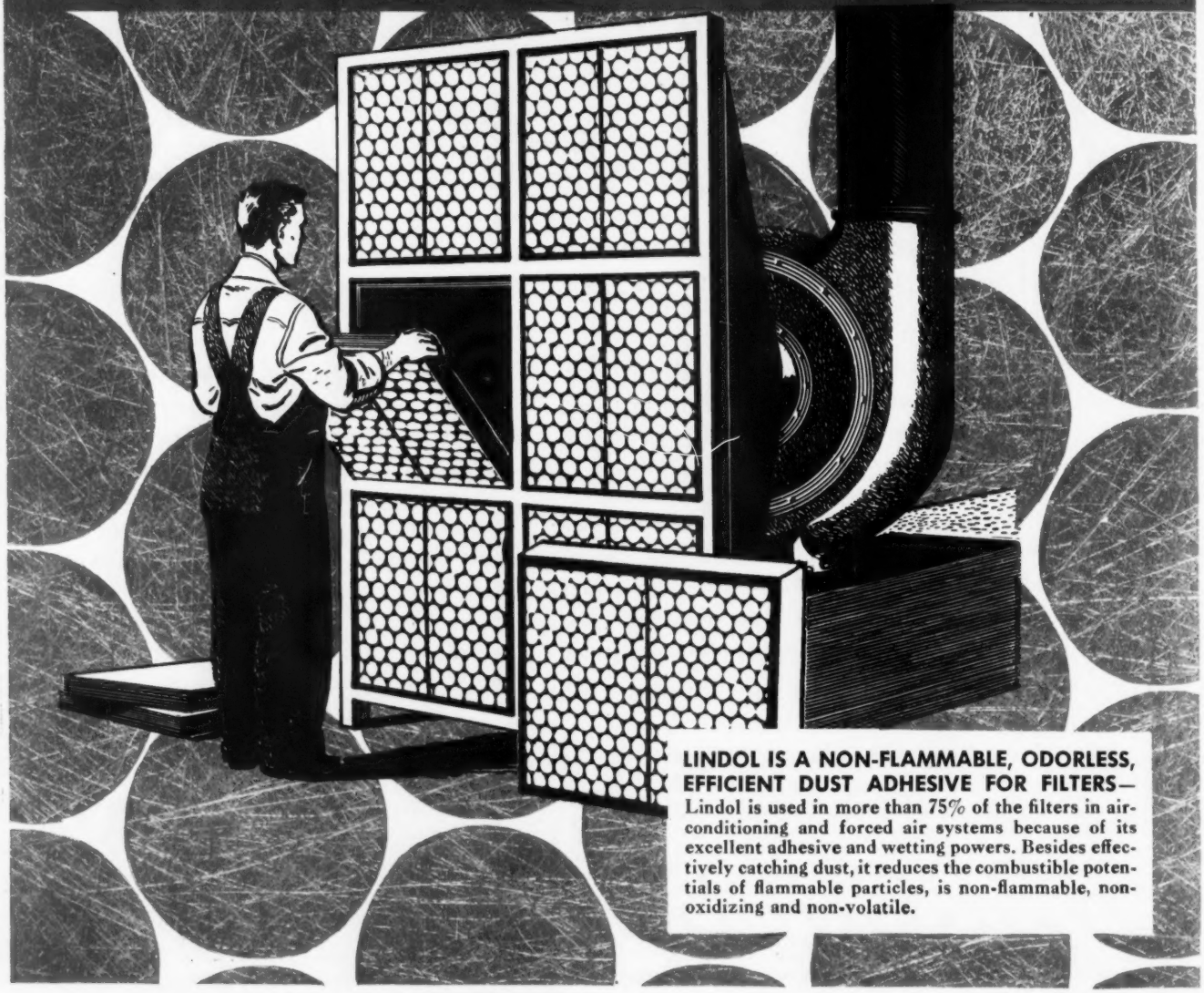
Name ..... Title .....
Company .....
Street Address .....
City ..... State .....

*Reg. U. S. Pat. Off. by Hercules Powder Company

Celanese® Chemicals



LINDOL IS A NON-FLAMMABLE, ODORLESS, EFFICIENT DUST ADHESIVE FOR FILTERS—
Lindol is used in more than 75% of the filters in air-conditioning and forced air systems because of its excellent adhesive and wetting powers. Besides effectively catching dust, it reduces the combustible potentials of flammable particles, is non-flammable, non-oxidizing and non-volatile.

CELANESE CORPORATION OF AMERICA

VERTICAL RESEARCH

. . . key to the development of synthetics

THE VERY NATURE of synthetics—their limitless potentials—demands research equally advanced. For the whole idea of synthesis is far more than just so many new chemicals.

Synthetics actually have relieved industry of long, costly searches for remote materials—materials which may only approximate advanced needs.

Celanese research has long specialized in selected fields—plentiful, low-cost base materials of maximum potentials. By intensive, *vertical* development Celanese expands their usefulness.

One group of hydrocarbon derivatives alone has greatly aided chemical engineers—the Lindol family of organic phosphates pioneered by Celanese.

From the original Lindol, an improved plasticizer, each variation is tailored to a specific need. As a lubricant additive, Lindol brings higher film strength to modern aviation motor oils—to resist high temperatures—to dissolve resinous deposits.

*Reg. U. S. Pat. Off.

A series of formulas made possible tougher quick-drying lacquers for non-toxic films coming in contact with foods. Again, Lindol is an important component of anti-fouling paints used on the hull-bottoms of naval craft.

On warships Lindol in vinyl compounds provides tough, non-flammable, non-oxidizing coatings for electrical cables. Lindol as the sealing fluid in die-casting machines prevents fires from explosions. A steel company uses a type of Lindol to lubricate copper molds receiving molten metal.

Problems of viscosity, stability, specific gravity, polishing, cooling, solubility, plasticizing, emulsifying—all are welcomed by Celanese research—and in terms of the exact characteristics specified.

It's the way we like to work. May we have the opportunity of working with *you?* Celanese Chemical Corporation, a division of Celanese Corporation of America, 180 Madison Avenue, New York 16, N. Y.

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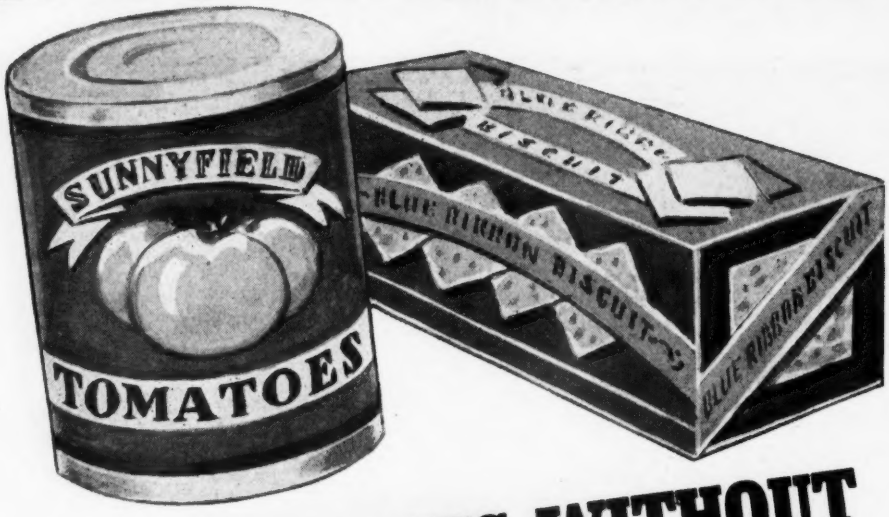
ORGANIC PHOSPHATES

LUBRICANT ADDITIVES

INTERMEDIATES

DYE-STUFFS

TEXTILES • PLASTICS • CHEMICALS



PACKAGES WITHOUT COLOR OFFER LITTLE SALES APPEAL

Pictures of foods in color stimulate the taste glands. Take color out of food labels, packages and advertising, and sales will drop. This is true of many products.

Artists use brilliant hues, and printers reproduce them, to increase your enjoyment of a beautiful picture, and to promote your desire for innumerable things.

These arresting hues would be far less persuasive *without* chemical purity. Chemical purity, as found in Baker's Sodium Tungstate, Sodium Molybdate, Lead Acetate or Lead Nitrate, is essential to printing inks of brilliant color—gives them a brilliance that remains alive even when attacked by sunlight and moisture.

The printing and lithographic industry is only one of the many industries where a fine or industrial chemical, manufactured by Baker to exacting standards, makes possible the betterment of products or services.

Baker Chemicals, purity by the ton, have been made for a large number of the nation's leading concerns for the manufacture and processing of numerous products.

If you have a special chemical requirement involving purity to the decimal for war production or for the post-war reconversion program, we invite you to discuss your needs in confidence with Baker.

7

Baker Chemicals

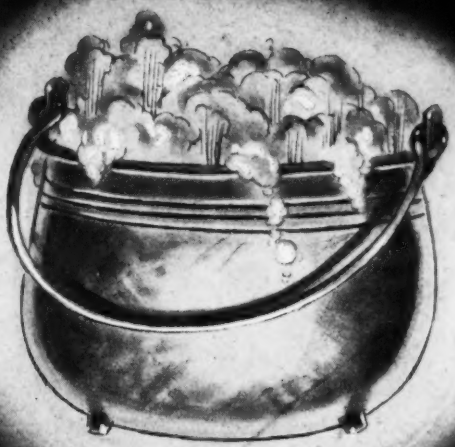
FOR THE COLOR AND PRINTING INK INDUSTRIES

- Sodium Tungstate
- Sodium Molybdate
- Lead Nitrate
- Lead Acetate
- Magnesium Carbonate
- Acid Nitric
- Stannous Chloride

J. T. Baker Chemical Co., ***Executive Offices and Plant:*** **Phillipsburg, New Jersey** · ***Branch Offices:*** **New York, Philadelphia and Chicago**

Baker's Chemicals

C. P. ANALYZED · · FINE · · INDUSTRIAL



Control Foam with Nuchar

Nuchar Activated Carbon is being used extensively to adsorb impurities in the manufacture of many chemicals and pharmaceuticals. Its use has been extended to new fields which include many wartime developments. For example, it is playing a very important part in the production of penicillin, sulfa drugs, atabrin, and other medicines so important in saving the lives of men in our armed forces.

In industries, such as the manufacture of glycerin, Nuchar Activated Carbon represents an application where full advantage is taken of the active surfaces of the carbon. Here Nuchar accomplishes not only color removal, but also readily adsorbs odors and other impurities responsible for foaming. U. S. P. glycerin is usually so highly purified that Nuchar is used solely for color and odor removal. However, it is an invaluable aid in the production of glycerin to meet specialty requirements by industrial users of glycerin. The ability of Nuchar to remove impurities responsible for foaming is used to advantage in production of dynamite grades of glycerin destined for use as an antifreeze in automobile radiators.

Purification of glycerin by adsorption can be measured by improvements in color, odor, and foaming characteristics but in other products, the benefits of Nuchar treatment may be measured by increased boiling point, a higher melting point, greater crystal yield, and other product improvements. Investigate the possibilities of Nuchar Activated Carbon in *your* process.

Nuchar Activated Carbons ★ Abietic Acid ★ Snow Top Precipitated Calcium Carbonate ★ Liquid Caustic Soda ★ Chlorine Lignin ★ Liqro Crude Tall Oil ★ Indusoil Distilled Tall Oil ★ Tall Oil Pitch ★ Sulphate Wood Turpentine

NUCHAR

INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP AND PAPER COMPANY

230 PARK AVENUE, NEW YORK 17, N.Y. · 35 E. WACKER DRIVE, CHICAGO 1, ILLINOIS · 748 PUBLIC LEDGER BLDG., PHILADELPHIA 6, PA. · 844 LEADER BLDG., CLEVELAND 14, OHIO

CATALYSTS

make world skyways even shorter

• The story of air transportation is more amazing than ever, since the development of high octane gasoline.

Harshaw catalysts have proved a great help to refiners in the production of this powerful gasoline which has made possible delivery time records that have greatly shortened the world's skyways.

Harshaw supplies catalysts for *Alkylation, Isomerization, Dehydrogenation, Hydroforming, Hydrogenation, Polymerization, Dehydration,* and other purposes.

If you are exploring other uses for catalysts, and would like samples for testing, Harshaw will gladly furnish them.

TYPICAL CATALYSTS

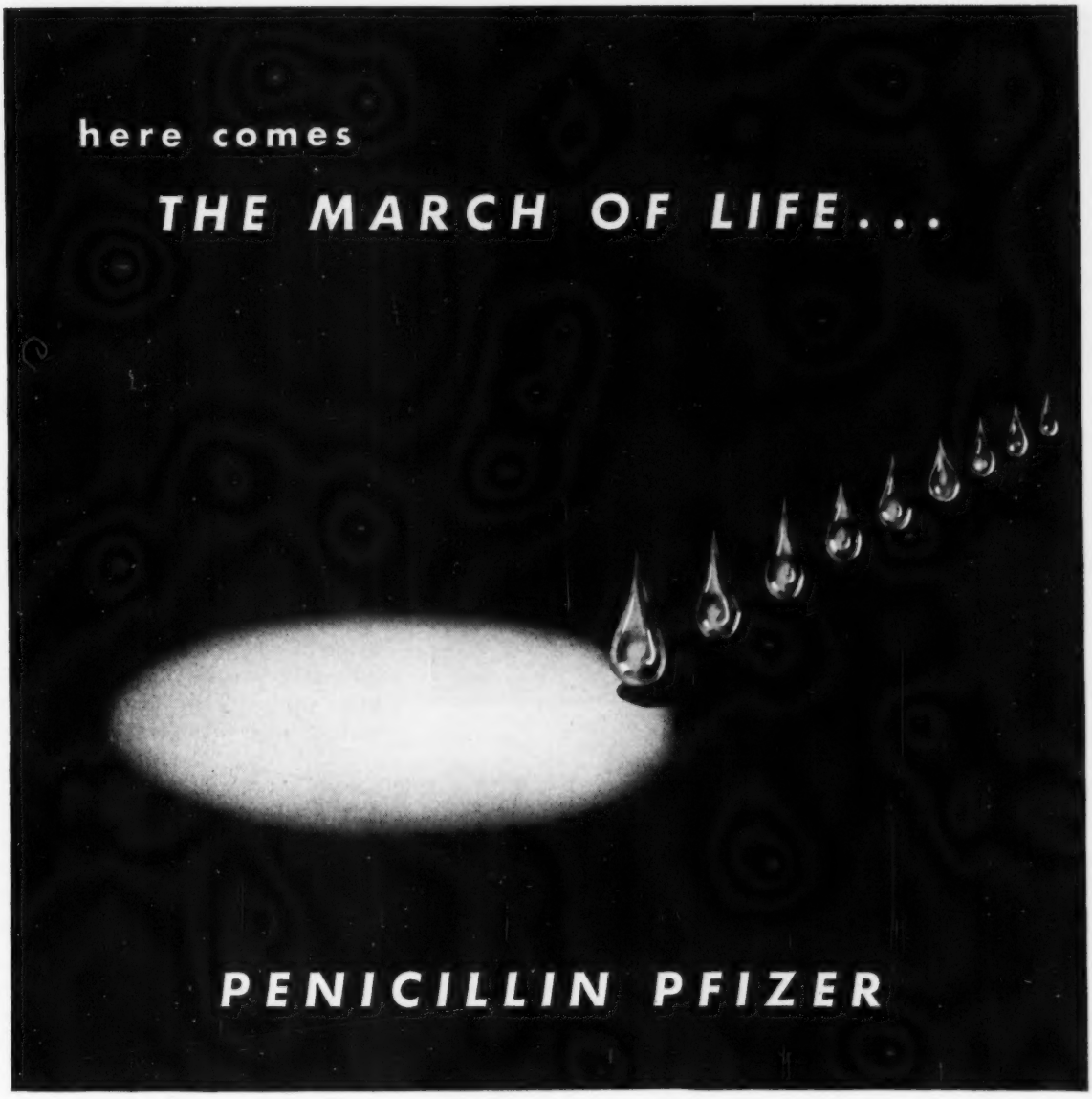
Anhydrous Hydrofluoric Acid • Aluminum Chloride
Boron Trifluoride • Anhydrous Hydrochloric Acid

Activated Alumina	Molybdenum Alumina
Chrome Alumina	Tungsten Alumina
Chrome	Nickel
Cobalt	Phosphates
Iron	Thorium
Magnesia	Titanium
Molybdenum	Tungsten

We have a large capacity for pelleting

HARSHAW

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES



• **Disease is a war no treaty can end. It is germ and infection against man in a continuing series of life-and-death struggles. Medicine marches with man as an ally with penicillin in the front rank.**

Behind penicillin's phenomenal rise to prominence is the almost unbelievable germ-battling power of this drug. Tests have shown — *one part of penicillin in many millions has inhibited the growth of bacteria.*

The world's largest manufacturer of penicillin is Chas. Pfizer & Co. The Pfizer organization is discharging an increasingly heavy responsibility and fully realizes the importance of its work to the saving of human lives. It is continually adding new precautions and safeguards of quality to those developed during its ninety-five year period of service to medicine and industry.

THE WORLD'S LARGEST PFIZER QUALITY PRODUCER OF PENICILLIN

Chas. Pfizer & Co., Inc.

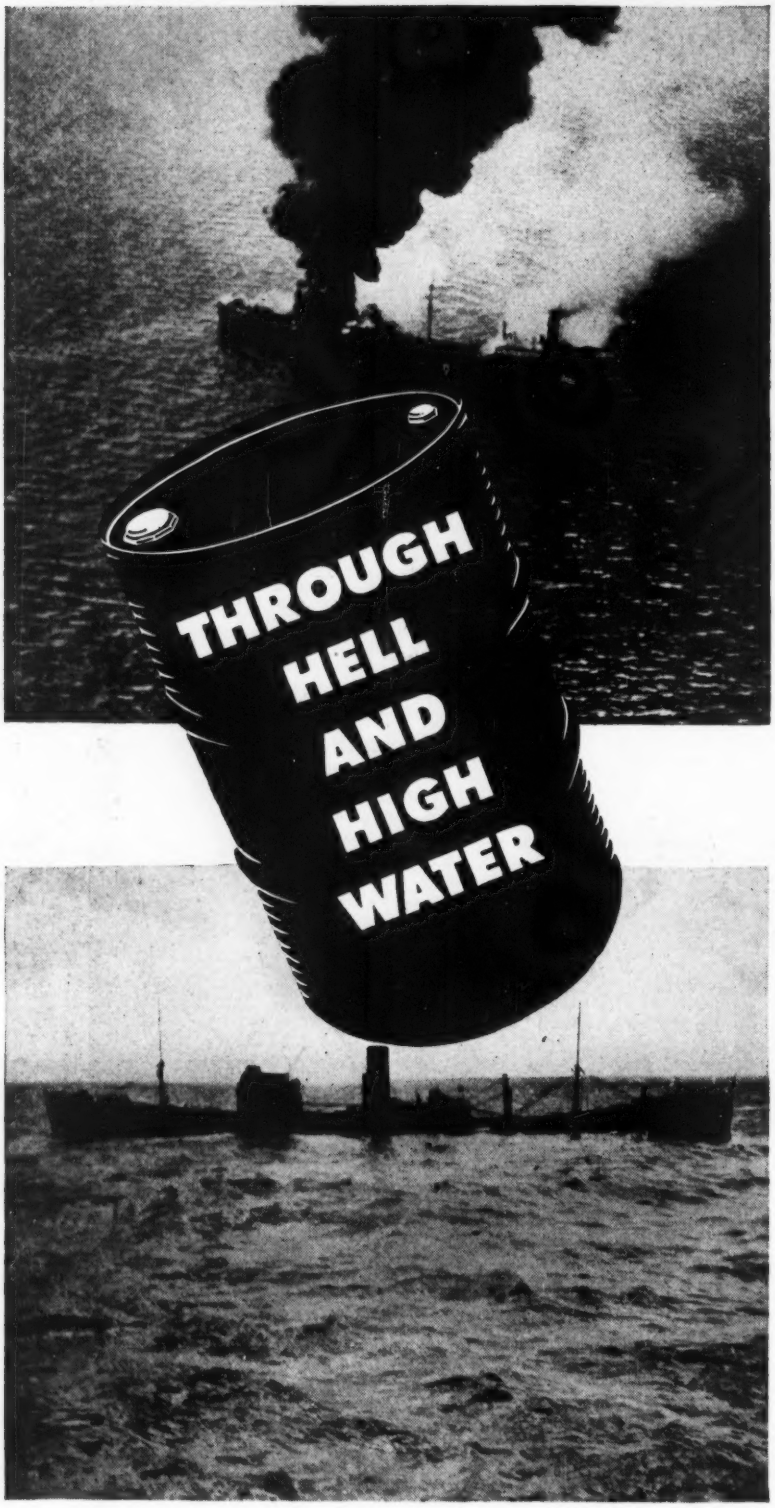
Manufacturing Chemists • Estab. 1849

81 MAIDEN LANE, NEW YORK 7, N. Y.

444 WEST GRAND AVE., CHICAGO 10, ILL.

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

CHEMICALS FOR THOSE WHO SERVE MAN'S WELL-BEING



RECENTLY, a ship sailing from an East Coast port was found to be afire in one of the holds which contained drums of oil. Hoses and pumps were put to work pouring hundreds of tons of water into the inferno, in the hope that the drums would not explode, which would turn the ship into a blazing torch.

When the vessel reached port, and the fire was finally overcome, the drums that were in the hold were put ashore. They were found to be badly scorched, with all the paint and brands burned off, leaving no identification of the contents. A number of drums were opened through the 3/4-inch closure. Samples of the oil were taken which, after a test, were found to contain no water—even though the drums had been pounded by hundreds of tons of water, and submerged for hours.

•

A vessel outward bound from the United States sprang a serious leak in one of the holds when she was one day out. The cargo of about 500 drums of lubricating oil in the hold was soon submerged by the inrush of water.

The ship was turned back, and finally made port, where pumping operations cleared the hold of water to enable repairs to be made. The 500 drums of oil were unloaded onto the wharf, where they were examined to ascertain if the contents had been contaminated by the water. In every drum it was found that the oil was intact, and absolutely free of water. After the drums had been cleaned, their return to the ship was authorized, and soon they were sent to their destination overseas.

•

The drums on both of these ships were sealed with *Tri-Sure Closures*. In their safe passage "through fire and water," these drums add their testimony to evidence all over the world that every drop of liquid in a Tri-Sure equipped drum is safe anywhere, under any conditions. They are a reminder of what is true today, as it was yesterday, and as it will be tomorrow: *it always pays to specify "Tri-Sure fitted drums."*

Tri-Sure
Reg. U. S. Pat. Off.
CLOSURES

AMERICAN FLANGE & MANUFACTURING CO. INC., 30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
TRI-SURE PRODUCTS LIMITED, ST. CATHARINES, ONTARIO, CANADA

DIAMOND

Dependably Serving Industry . . .

58% Light Soda Ash

58% Dense Soda Ash

Fused Soda Ash Briquets

Bicarbonate of Soda U.S.P.
Powdered, Granular

Bicarbonate of Soda,
Free-Flowing

Bicarbonate of Soda,
Technical

76% Caustic Soda
Solid, Ground, Flake

Liquid, Caustic Soda
50% NaOH,
73% NaOH

Liquid Chlorine
Tank Cars and Cylinders

Carbon Tetrachloride
Tank Cars and Drums

Chlorowax
(Resinous Chlorinated
Paraffin)

Dry Cleaning Solvents

Laundry Soda

Cleaner and Cleanser

Textile Soda

Diamond Soda Crystals

Sesquicarbonate of Soda

Special Alkalies
All Strengths
Ground, Flake

High Test Alkali

Diamond Detergent

Hydrolate

Hydrobreak

Paralate

Sesquilate

COKE AND BY-PRODUCT DEPARTMENT

Coal

Coke
Domestic, Foundry

Benzol
Pure, Nitration

Chemical Limestone

Toluol
Pure, Nitration

Ammonia

Tar, Crude

Gas, Coke Oven

Crude Heavy Solvent

Motor Fuel

Xylol

★ ★ ★

STANDARD SILICATE DIVISION

Silicate of Soda, Liquid
All Grades
Water White 42°

Silicate of Soda, Glass

Silicate of Soda,
Concrete Special

Sodium Metasilicate

Sodium Orthosilicate

Sodium Supersilicate

Alkalate

Metalate

Ortholate

STANDARD CHROMATE DIVISION

P. O. Box 247,
Painesville, Ohio

Bichromate of Soda
Crystal, Granular,
Anhydrous, Liquid

Chromate of Soda
Anhydrous, Liquid

Ammonium Bichromate

Bichromate of Potash
Crystal, Granular

Potassium Chromate

Potassium Sodium
Chromate

Chrome Salt Cake

Tanning Salts

★ ★ ★

PURE CALCIUM PRODUCTS DIVISION

Address: Painesville, Ohio

Precipitated Calcium Carbonate Pigments for Paint, Rubber and Paper according to following brands:

Swansdown
Suspenso
Kalite
Non-Fer-Al
Surfex
Paper Grade
Multifex
Kalvan
Millical

ALKALI

DIAMOND ALKALI COMPANY

PITTSBURGH, PA., *and Everywhere*

GENERAL AMERICAN *for* BETTER

Nothing is easier to claim, or harder to supply, than *better engineering*. General American is able to offer better engineering because we have secured the services of *outstanding engineers*, and have furnished them with every facility for better, more constructive work. We would like to demonstrate what this can mean to you.

• GENERAL PROCESSES

For processes incorporating both evaporators and drum dryers our Technical Staff is available to help you lay out and connect these units. We have our equipment details and our experience should be helpful. Use our service wherever two or more different units of our manufacture are involved, be they filters, evaporators, agitators, dryers or other items marketed by us. Any special equipment is more efficient if the entire group used in the process is designed to work as a unit.

• CONKEY EVAPORATORS

No type of equipment manufactured by General American better demonstrates the "Better Engineering" offered by this organization than Conkey Evaporator Equipment.

Every Conkey Evaporator design provides for maximum accessibility, minimum entrainment losses and high heat transfer. Each unit will give long-time, trouble-free operation with low maintenance and supervision costs.

Conkey evaporating equipment includes:

Long Tube Film Type Evaporators
Long Tube Vertical Recirculation Evaporators
Vertical Tube Forced Circulation Evaporators
Submerged Tube Forced Circulation Evaporators

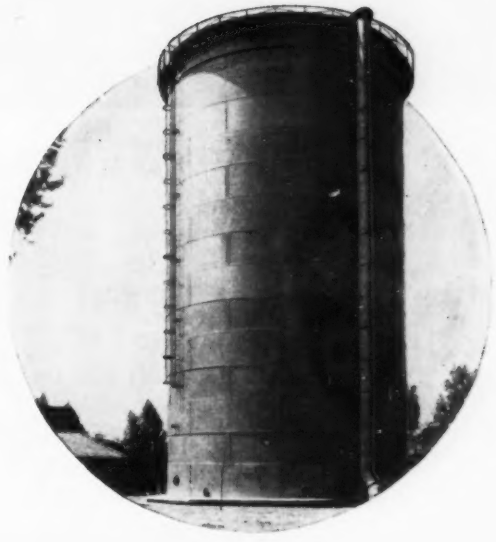
The flexibility of General American designs makes them readily adaptable to efficiently meet special process requirements.

• GENERAL AMERICAN DRUM DRYERS

After many years of development, General American Drum Dryers are now widely accepted as a leader in the field of industrial drying equipment. For among many patented features are the "Air-Finger" blade bar which prevents sticking and fouling, cast-iron drums, finished under steam pressure and temperature to assure true cylindrical shape under working conditions, and steam joints that require no packing or lubrication other than the condensate itself. We would be happy to explain in detail how a General American Drum Dryer can increase your production capacity—lower your cost, because it is individually engineered to do a job—not just to meet a "spec."

ENGINEERING!

• PLATE FABRICATION OF EVERY SORT



General American's Plate & Welding Division at Sharon, Pa. is *headquarters* for a diversified list of plate fabrication equipment.

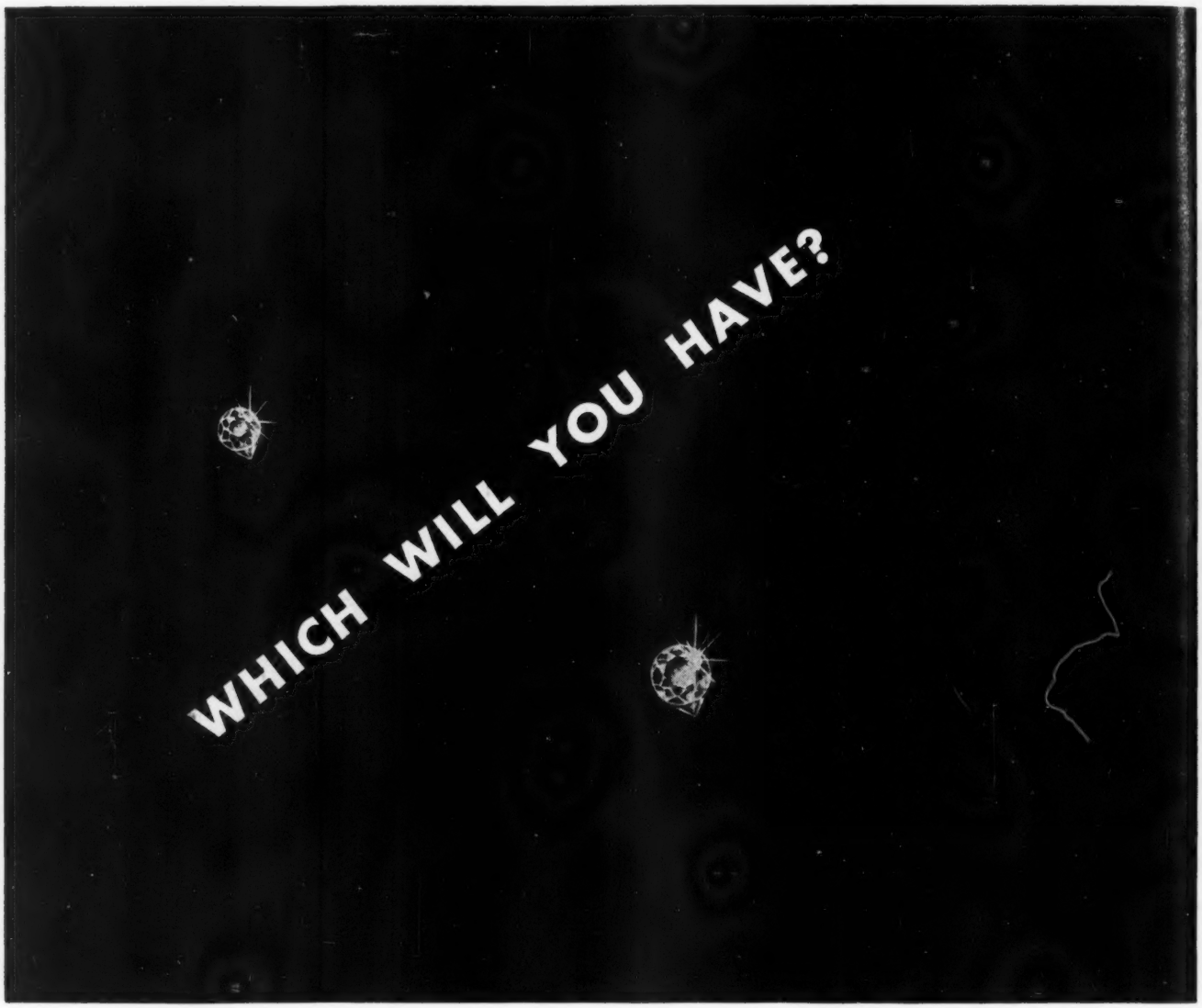
If you are in the market for accumulators, crystalizers, dissolvers, heat exchangers, absorption towers, condensers, rotary kilns, digesters, storage tanks for oil, water, acid, etc., or any of the many types of plate fabrication—remember, General American is equipped to manufacture virtually anything made of carbon, stainless and alloy steels, Everdur, aluminum and other special alloys—either welded or riveted. General American offers, as well, complete X-ray facilities, heat-treating and stress-relieving furnaces and is in position to build and test all classes of welded vessels to API-ASME, ASME and other codes. Its unusually large manufacturing facilities are further supplemented by a staff of recognized engineers and scientists—complete research and development laboratories at both Sharon and Louisville, as well as a large field erection department for either foreign or domestic work. This all adds up to a combination which we believe to be unmatched elsewhere in America. Don't hesitate to call on us for any information that can be of assistance to you.

GENERAL AMERICAN

TRANSPORTATION GATX CORPORATION

PROCESS EQUIPMENT DIVISION — PLATE & WELDING DIVISION

General Sales Offices: 513b Graybar Bldg., New York 17, N. Y. • *Works:* Sharon, Pa., and Louisville, Ky.
Sales Offices: Louisville, Chicago, Sharon, Cleveland, Pittsburgh, St. Louis, Salt Lake City, San Francisco, Tampa, Washington, D. C.



Size alone does not determine the value of diamonds. *Quality* in every detail—cut, color, brilliance and clarity—must be considered. Likewise, in modern chemical industry, quality in every detail has an important bearing on the value of the whole process. Such emphasis upon *quality* accounts, in a large measure, for the consistently dependable performance of *V-C* products, be their applications great or small.

Phosphoric Acids

Calcium Phosphates

Sodium Phosphates

Sulfuric Acid

Special Phosphates and Compounds

Also distributors of other heavy chemicals

VC CHEMICALS

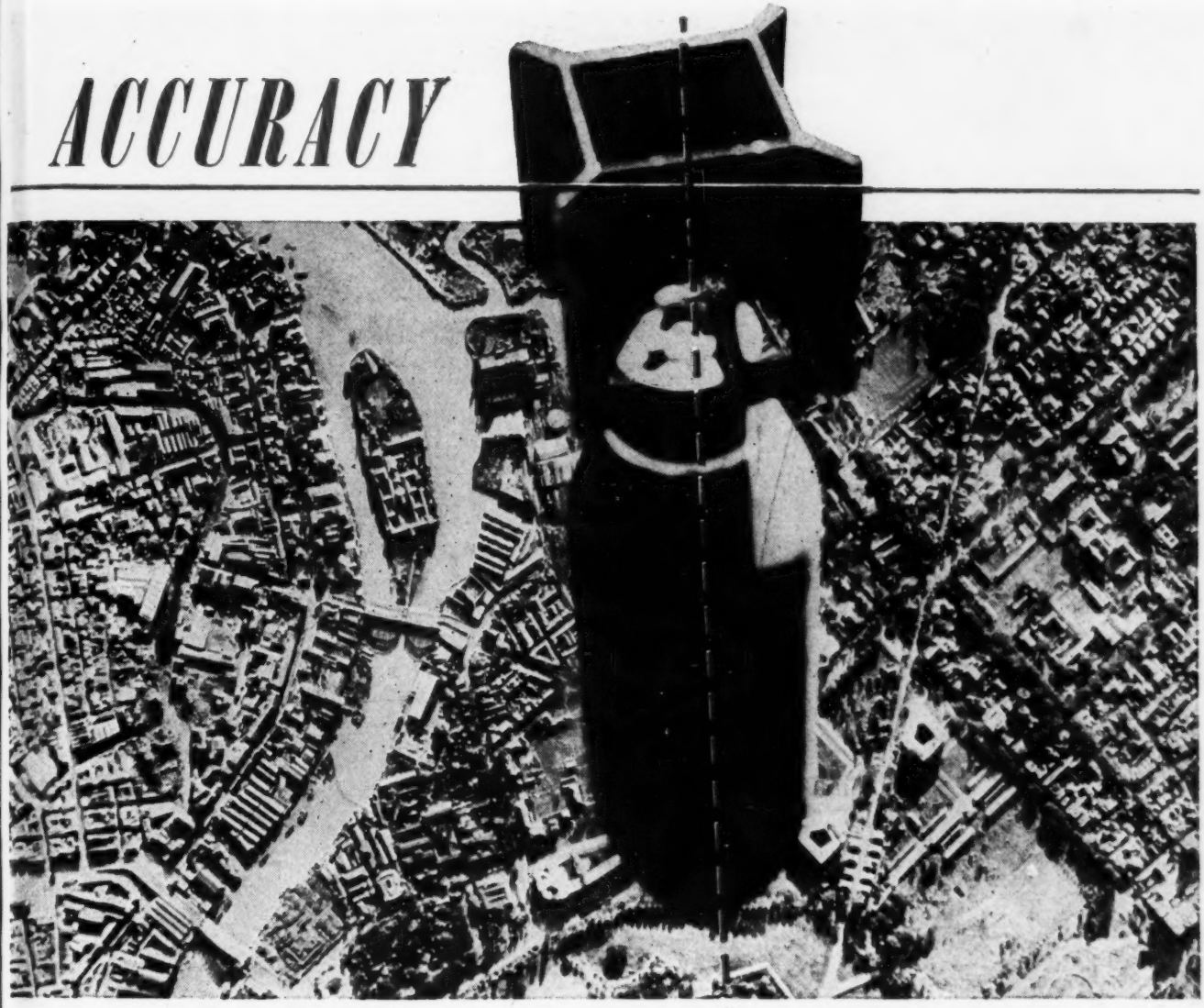
VIRGINIA-CAROLINA CHEMICAL CORPORATION

RICHMOND 5, VIRGINIA

SALES OFFICES: Atlanta, Ga.; Baltimore, Md.; Birmingham, Ala.; Carteret, N. J.; Charleston, S. C.; Cincinnati, Ohio; Columbia, S. C.; Greensboro, N. C.; Jackson, Miss.; Memphis, Tenn.; Montgomery, Ala.; Norfolk, Va.; Orlando, Fla.; Richmond, Va.; Savannah, Ga.; Shreveport, La.; E. St. Louis, Ill.; Wilmington, N. C.

H A N D I N H A N D W I T H I N D U S T R Y

ACCURACY



Everytime IN YOUR LABORATORY

SINGLING OUT a pre-designated target and striking it with uncanny accuracy . . . that's what our airmen achieve with the new science of "pin-point" bombing.

FOR THE SAME "on target" accuracy in the laboratory, many chemists count on Baker & Adamson Reagents—the *precision* chemicals for today's exacting analytical requirements. The high purity and constant uniformity of each B&A Reagent are built in throughout every stage of manufacture—from initial processing of raw materials down to the last of many exclusive B&A production controls.

AS A RESULT, each product has the "Baker & Adamson Quality" that means *accuracy* to chemists throughout America . . . the accuracy you can get by specifying "B&A" on your next order of laboratory chemicals.

Setting the Pace in Chemical Purity Since 1882

BAKER & ADAMSON B&A QUALITY STANDARD OF PURITY

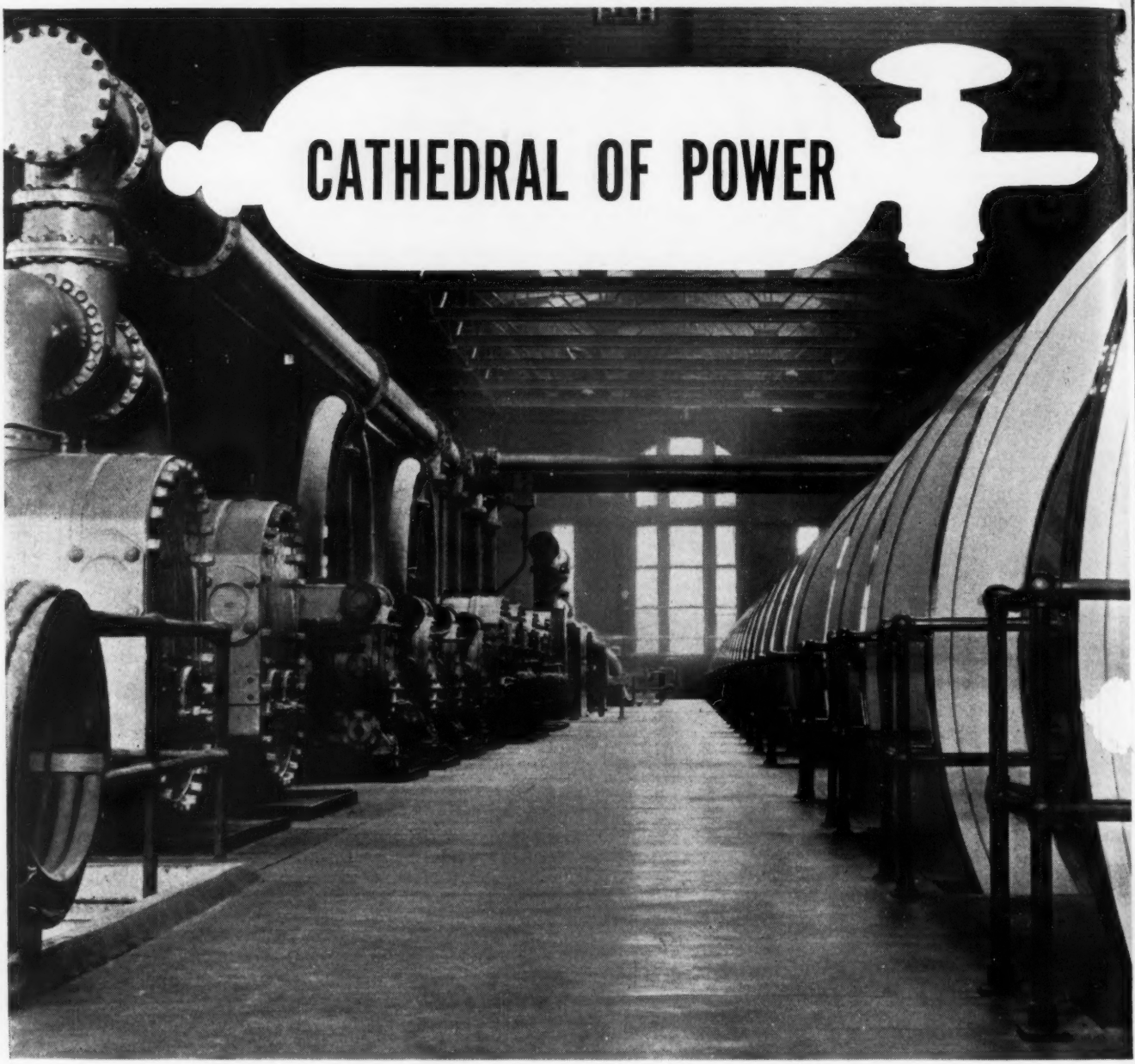
BAKER & ADAMSON *Reagent and Fine Chemicals*

Division of GENERAL CHEMICAL COMPANY, 40 Rector St., New York 6, N. Y.

Sales and Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) • Buffalo • Charlotte (N. C.) • Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh • Providence (R. I.) • San Francisco • Seattle • St. Louis • Utica (N. Y.) • Wenatchee • Yakima (Wash.)

In Wisconsin: General Chemical Wisconsin Corporation, Milwaukee, Wis.

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver



• Compressor room, North Plant, Wyandotte Chemicals Corporation, Wyandotte, Michigan. Heart of the processing operations, source of power, gas and air compression, vacuum, and pumping requirements of the North Plant, its shops and salt wells. Here originates power used to transform salt, limestone and coal into alkalies and chemicals.

WYANDOTTE CHEMICALS CORPORATION

ONE OF THE WORLD'S GREAT PRODUCERS OF CHEMICALS

SODA ASH
CAUSTIC SODA
BICARBONATE OF SODA
CALCIUM CARBONATE
CALCIUM CHLORIDE
CHLORINE
HYDROGEN
SODIUM ZINCATES
AROMATIC INTERMEDIATES
DRY ICE
Other Organic and Inorganic Chemicals

WYANDOTTE CHEMICALS CORPORATION
MICHIGAN ALKALI DIVISION • WYANDOTTE, MICHIGAN

Wyandotte
REG. U. S. PAT. OFF.

VITAL TO VICTORY TODAY—READY TO WORK FOR A GREATER TOMORROW

Sharples
TRIETHYLAMINE

SHARPLES TRADE MARK CHEMICALS

$(C_2H_5)_3N$

SPECIFICATIONS

Color	Water White
Sp.Gr. at 20/20° C.	0.73
Triethylamine Content	Not less than 98.5%
Water Insoluble (20-30° C.)	None
Distillation:	
Initial boiling point	Not below 85° C.
Final boiling point	Not above 91° C.

PROPERTIES

Molecular Weight (Calc'd.)	101.2
Average Weight at 20° C.	6.1 lb./gal.
Flash Point (open cup)	20° F.
Freezing Point	Approx. –114° C.
Refractive Index at 20° C.	1.4003

Triethylamine is miscible in all proportions with water below 18° C. but the solubility rapidly decreases as the temperature is raised. It is soluble in most common organic solvents.

APPLICATIONS

Triethylamine may be used in the synthesis of quaternary ammonium compounds, special types of which are useful as textile assistants. The oleic acid soap of this amine causes marked reduction of sinking times in the Draves and Canvas Disc tests and may therefore be of interest as a wetting or penetrating agent for textiles. It is also employed as a stabilizer for certain chlorinated hydrocarbons.

AVAILABILITY

Triethylamine conforming to the above specifications is available in moderate commercial quantities. Another grade (Triethylamine No. 193), containing a minimum of 88% Triethylamine, is readily available in larger volume and at a considerably lower price. Further information will be sent gladly at your request.

* * *

Sharples will welcome the opportunity of cooperating with those who may be interested in Triethylamine, either as a possible solution to an old problem or for an entirely new application.

ARMY E NAVY

Sharples Chemicals Inc.

PHILADELPHIA · CHICAGO · NEW YORK

SHARPLES SYNTHETIC ORGANIC CHEMICALS

PENTASOL (AMYL ALCOHOLS)
PENT-ACETATE (AMYL ACETATE)
PENTALARM (AMYL MERCAPTAN)
BURAMINE (CRUDE BUTYL UREA)
PENTAPHEN (p-tert-AMYL PHENOL)
o-AMYL PHENOL DIAMYL PHENOL
DIAMYLPHENOXY ETHANOL

MONOAMYLAMINE DIAMYLAMINE TRIAMYLAMINE
MONOBUTYLAMINE DIBUTYLAMINE TRIBUTYLAMINE
MONOETHYLAMINE DIETHYLAMINE TRIETHYLAMINE

DIETHYLAMINOETHANOL
ETHYL MONOETHANOLAMINE ETHYL DIETHANOLAMINE
MIXED ETHYL ETHANOLAMINES
DIBUTYLAMINOETHANOL
BUTYL MONOETHANOLAMINE BUTYL DIETHANOLAMINE
MIXED BUTYL ETHANOLAMINES
MIXED AMYL CHLORIDES DICHLOROPENTANES
AMYL NAPHTHALENES MIXED AMYLENES

SHARPLES CHEMICALS INC.

EXECUTIVE OFFICES: PHILADELPHIA, PA.
PLANT: WYANDOTTE, MICH.

Sales Offices

New York Chicago Salt Lake City
West Coast: MARTIN, HOYT & MILNE, INC., Los Angeles . . San Francisco . . Seattle

DU PONT ANNOUNCES

that effective April 1, 1945,
trade names have been adopted for the
following Vinyl Products:

ELVANOL

For products formerly sold as Polyvinyl Alcohol, PVA, PV Alcohol, and other similar names.

ELVACET

For products formerly sold under the names of PV Acetate, Polyvinyl Acetate Emulsion, Polyvinyl Acetate Beads, Polyvinyl Acetate Solutions, and others denoting various forms and grades of Polyvinyl Acetate.

★ ★ ★ ★

A number of different grades of "Elvanol" and "Elvacet" are available. Inquiries about these products and their suitability for specific use should be addressed to E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington 98, Delaware.

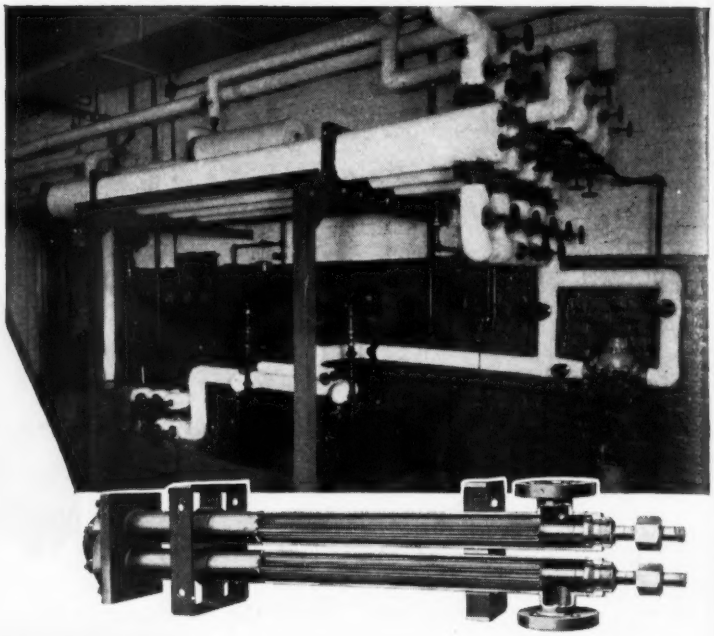
SAVE A LIFE—BE A BLOOD DONOR!

DU PONT ELECTROCHEMICALS

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

TWIN G-FIN SECTION FUEL OIL HEATER

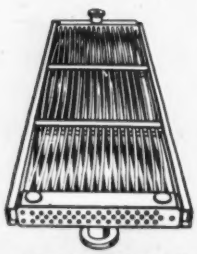


ONLY G-R BUILDS THIS WIDE VARIETY OF HEAT TRANSFER APPARATUS

SHELL and BARE TUBE
Heaters, Coolers, Condensers, Heat Exchangers

G-FIN
Longitudinal-finned elements for greater heat conductivity

K-FIN
Helical-finned elements for vapors and gases



BENTUBE SECTIONS
with scale-shedding elements for hard or salt water

TUBEFLO SECTIONS
Non-clogging design for residuum and other dirty fluids

Simple

Just a pipe within a pipe—that's the principle of the Twin G-Fin Section. The G-Fin inner pipe, through which the steam passes, has longitudinal fins to provide greater surface for transfer of heat to the oil flowing through the outer pipe.

Readily Installed

The Twin G-Fin Section is easily handled, and can be placed close against a wall, ceiling or floor . . . wherever most convenient. Movable supports further assist convenient installation.

Easy To Clean

The G-Fin heating elements or pipes may be completely removed from the shells for cleaning, without disturbing the oil connections. No special tools are required.

Flexible Capacity

These units are standard and interchangeable. They may be arranged in series or parallel; and at partial loads, sections may be cut in and out to maintain constant oil temperature.

Compact

The longitudinal G-Fins provide at least six times as much heat transfer surface as bare tubes . . . the result: the Twin G-Fin unit has fewer tubes than any other type of heater.

Leak-proof

Leakage between steam and oil cannot occur because there are no internal joints.

For complete description of this superior fuel oil heater, write for our Form 714.

THE GRISCOM-RUSSELL CO.

285 Madison Ave., New York 17, N. Y.

GRISCOM-RUSSELL
TWIN G-FIN SECTION
The Universal Heat Exchanger

It pays to be a Bemis Multiwall paper bag Customer

EVEN though direct government purchases have taken a considerable part of our multiwall paper bag production this year, Bemis customers have not suffered . . . they have been supplied on the basis of past purchases, even in the face of the labor shortage and no increase in facilities.

Naturally, the demand for Multiwalls has been greater than the supply. Much as we regret inability to fill all orders, we have felt a responsibility to take care of our regular customers first. Fortunately, we've been able to do that—and right on schedule. If it's humanly possible, we'll keep on maintaining this service.

War or peace, we want our customers to feel that it pays to be Bemis customers.

NORTH
WEST EAST
SOUTH

A major reason we've been able to supply our Multiwall customers is the size and flexibility of our production facilities.

Bemis Multiwall Plants at

PEORIA, ILL.
EAST PEPPERELL, MASS.
MOBILE, ALA.
SAN FRANCISCO, CALIF.
WILMINGTON, CALIF.
ST. HELENS, ORE.

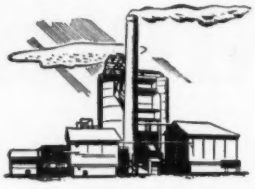
These plants not only give us large production, but also quick accessibility to all parts of the country.

BEMIS BRO. BAG CO.

Baltimore • Boston • Brooklyn • Buffalo • Charlotte • Chicago • Denver
Detroit • Houston • Indianapolis • Kansas City • Los Angeles • Louisville
Memphis • Minneapolis • New Orleans • New York City • Norfolk • Oklahoma City • Omaha • St. Louis • Salina • Salt Lake City • Seattle • Wichita

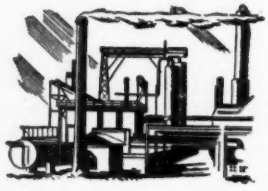
East Pepperell, Mass.

BADGER BRINGS WIDE EXPERIENCE



PETROLEUM

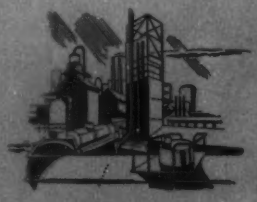
All Primary Products from Crude • Pure Hydrocarbons by Fractionation or Extraction • Catalytically Cracked Gasoline • Aviation Gasoline and all Components • Thermally Cracked and Reformed Motor Gasolines • Home Burning Oils • Solvent Extracted Lubricating Oils • Solvent Dewaxed Lubricating Oils • Filtrol Fractionated Lubricating Oils • Asphalts • Visbroken Fuels • Coke.



PETRO-CHEMICAL

Butadiene • Styrene • Toluene • Trinitrotoluene • Ethyl and other Alcohols • Acetic Anhydride • Formaldehyde • Phthalic Anhydride • Nitroparaffines • Chlorinated Hydrocarbons • Pure Hydrocarbons.

TO THESE MIGHTY WORLDS OF INDUSTRY



CHEMICAL

Industrial Ethyl Alcohol, Isopropanol and Higher Alcohols • Methanol, Synthetic and from Wood Distillation • Ethyl Acetate, Butyl Acetate and other Esters • Synthetic Acetic Acid and Acetic Anhydride • Nitrobenzene and other Nitro-Aromatics • Formic Acid and Higher Aliphatic Acids • Carbon Tetrachloride • Chloroform, etc. • Phenol, Cresols, etc., from Tar Acids • Aniline and other Amino-Aromatics • Beverage Alcohol and Spirits • Ethyl Ether and Isopropyl Ether • Acetone and other Ketones • Glycerine and Glycols • Phthalic Anhydride • Styrene • Ammonia • Butadiene • Fatty Acids • Ethyl Benzene • Formaldehyde • Nitroparaffines • Synthetic Phenol • Dibutyl Phthalate • Synthetic Camphor • Explosives and Smokeless Powder • Penicillin • And many others.

AN ACCEPTED business axiom is that "cumulative experience in interrelated fields creates an extra measure of proficiency in each of them." It applies with special emphasis to the Badger organization. . . . A long, rich and extremely broad experience is one of the reasons Badger is *always constructive*—confident—never held to hidebound rules or traditions—thoroughly capable of engineering new processes, designing new types of equipment, planning and erecting new kinds of plants in the fast-moving chemical, petro-chemical and petroleum refining worlds.

On these pages are listed some of the many products Badger process engineering and construction services have helped to put into commercial production. *A Bulletin amplifying the scope of Badger activities is available for the asking.*

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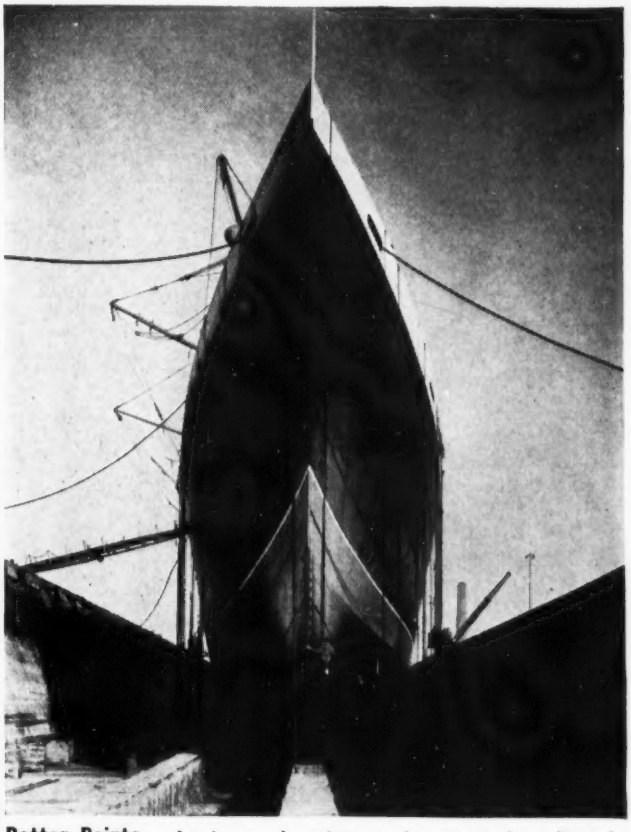
Better Foods—thanks to glycerine. C. P. glycerine, a product of nature, is a food itself. That's why it's so beneficial and safe to use in beverages, candies, flavorings, other food products.



Better Paints—thanks to glycerine, an important ingredient in the manufacture of alkyd resins, used for making tough, long-lasting protective coatings. Nothing takes the place of glycerine.

Why Glycerine is a Superior Humectant: LOW VAPOR PRESSURE

MANY materials and products are required to remain soft and pliable—not dry out through loss of moisture. Tobacco, adhesives, and dentifrices are just a few examples of this. Humectants (hygroscopic, water-attracting agents) are used to retain and preserve these qualities, by holding moisture, and also to add their own plasticizing action.

One of the most important properties needed in a humectant is resistance to evaporation—low vapor pressure. That is an outstanding characteristic of glycerine, which, together with its other properties, is the reason why glycerine is such a superior humectant, and why it is used by so many manufacturers.

The following table shows the vapor pressures (in millimeters of mercury) of glycerine and some other humectants at 30°C.

Glycerine	*Humectant "A"*	*Humectant "B"*	*Humectant "C"*
0.0005	0.16	0.009	0.32

This low vapor pressure of glycerine means that it will "stay put." It means that the composition of the material in which glycerine is used will remain substantially the same over long periods of time. It means satisfaction to consumer buyers.

Low vapor pressure, high viscosity, non-toxicity, high solvent power, compatibility, and other valuable properties, plus economy, make glycerine a superior humectant. Use glycerine, which is now freely available for the production of civilian goods. Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y., Dept. N-6.

Better Cosmetics—thanks to soothing C. P. glycerine, which helps to keep skin soft and smooth. Think of glycerine, now freely available, when you plan new products. Use it—and be *sure!*

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NO. 5 IN A SERIES DESCRIBING THE USE OF SUPER REFRACTORIES IN THE PROCESS INDUSTRIES

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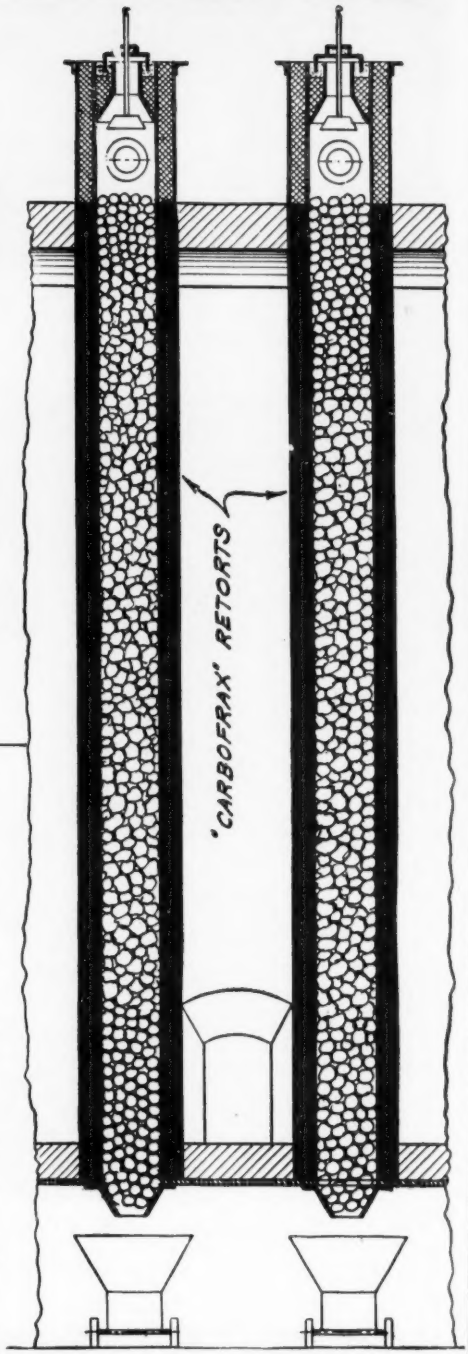
The ideal solution for many high-temperature indirect heating processes



ECONOMICAL OPERATION of the vertical retort for many high-temperature chemical and metallurgical processes has resulted from the use of "CARBOFRAX" silicon carbide retorts.

Much of this success is attributed to the high thermal conductivity of the "CARBOFRAX" retort. Having a conductivity eleven to twelve times that of fireclay, only moderate thermal gradients are required to transmit heat rapidly through the retort walls. Thus, combustion chamber temperatures are lowered—refractory difficulties are minimized—fuel efficiency is improved—closer temperature control is secured.

Long life and continuous service from the "CARBOFRAX" retort are assured by its high strength at elevated temperatures and exceptional resistance to mechanical abrasion and flame erosion.

There are many processes in the chemical and metallurgical fields to which super refractories by "CARBORUNDUM" can be advantageously applied to insure longer life—less maintenance—lower operating costs. Experienced refractories engineers will be glad to assist in their application. Write The Carborundum Company, Dept. F3, Refractories Division, Perth Amboy, N. J.

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As LATE as the eighteenth century, it was believed there were three kinds of lead —ordinary lead, tin, and bismuth.

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The suggestion that bismuth is a specific metal was first advanced by Georgius Agricola as early as the sixteenth century. But the fact that it is an element was not clearly recognized until the researches of Pott and Geoffroy in the eighteenth century.

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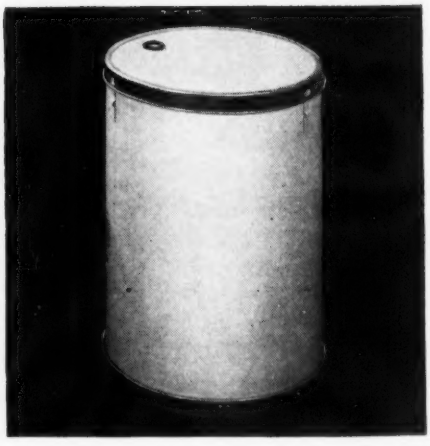

Continental Fibre Drums—Continental has a full line for shipping dry products, resins, rosins, asphalt, etc.; also grease and other semi-liquids. Continental drums cover a wide range of sizes; "Stapak" drums (illustrated) from 2 to 32 gal.; "Fiberpak" drums from ¾ gal. to 67 gal.; "Leverpak" drums from 12 to 75 gal.; Special drums from 15 to 55 gal. capacity.

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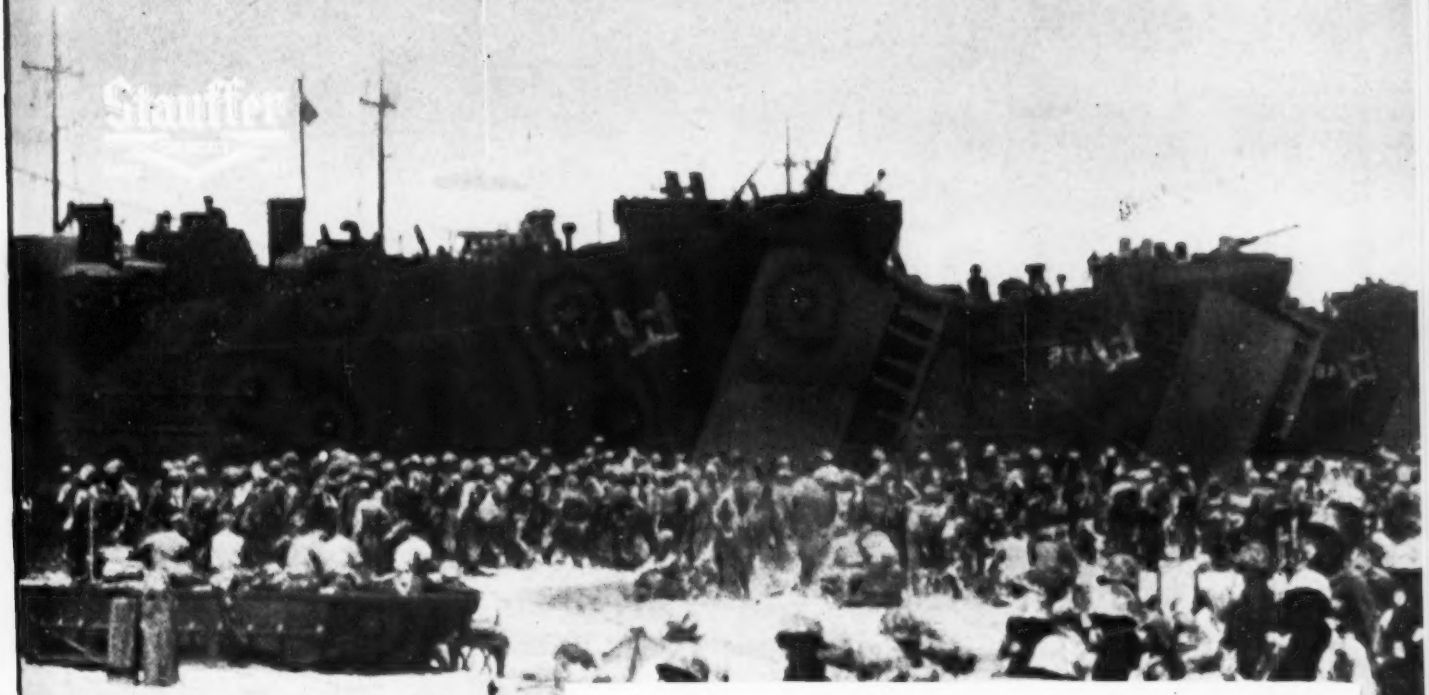

Official U. S. Coast Guard Photo

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Stauffer has been serving industry with basic chemicals for sixty years—and in war or peace is recognized as a dependable source of supply.

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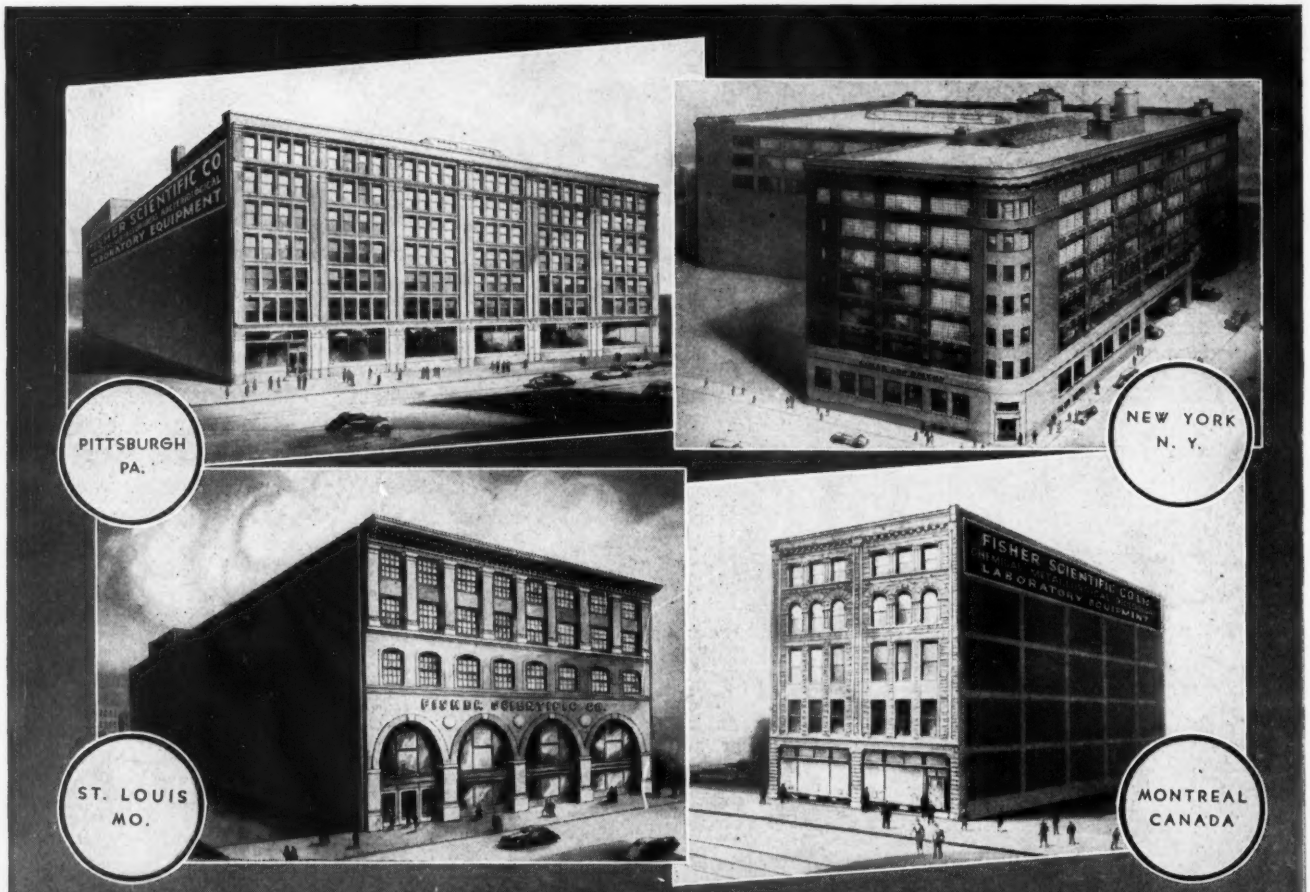

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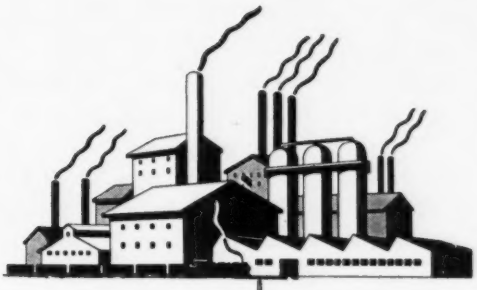
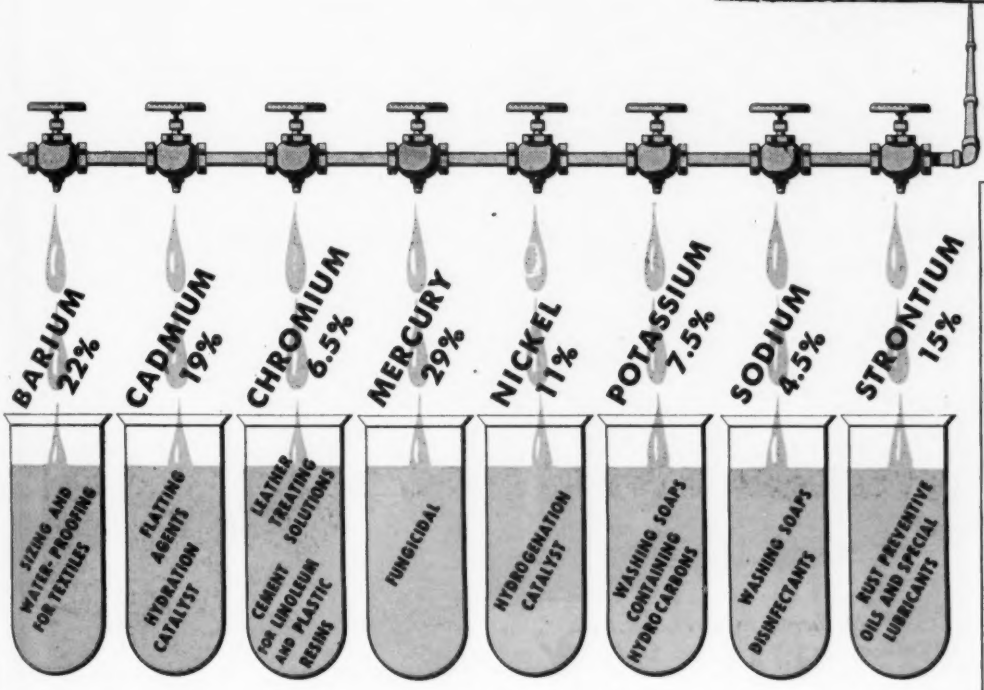
ORONITE RESEARCH BRINGS THESE METALLIC NAPHTHENATES





Individual metallic naphthenates will undoubtedly be valuable for many important applications. A few possible uses are suggested in the above chart. While these Oronite Naphthenates are not yet available in commercial quantities... laboratory samples are ready for distribution. Following are descriptions of the eight Oronite Naphthenates mentioned above.

Naphthenate	*Metal Content, %*	*Comb. Wt. of Naph. Acids*	*Appearance*
Barium	22	240	Amber amorphous solid
Cadmium	19	240	Amber solid
Chromium	6.5	240	Amber semi-solid
Mercury	29	240	Amber semi-solid
Nickel	11	240	Green solid
Potassium	7.5	240	Amber semi-solid
Sodium	4.5	240	Amber solid
Strontium	15	240	Amber amorphous solid

Send for a laboratory sample of one or more of these Oronite Metallic Naphthenates today. Be sure to specify which naphthenate you want, and remember Oronite Research Chemists are at your service should you desire assistance with your problem. There is no cost or obligation, of course.*

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Oronite Wetting Agent is a semi-fluid material valuable in both acid solutions and hard water.

Oronite Aliphatic Acids have valuable froth control properties in the flotation treatment of many types of ores.

Oronite Polybutenes are relatively high molecular weight co-polymers of straight and branched chain olefinic pure hydrocarbons. They serve many special manufacturing and industrial purposes.

Oronite Sodium Sulfonates, derived from petroleum sulfonic acids, are used as emulsifiers, emulsion breakers, anti-rust compounds, fat-splitting agents and metal cleaners; in oil emulsions, insecticides and sprays.

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The FMC Bean Sprayer is another product of the Company that makes

PEERLESS PUMPS

Back of every FMC product is the extensive research, creative engineering and manufacturing skill of Food Machinery Corporation.

PEERLESS PUMP DIVISION... makers of Deep Well Turbine, Hi-Lift & Hydro-Foil Pumps for every purpose. Los Angeles, San Jose and Fresno, California; and Canton, Ohio.

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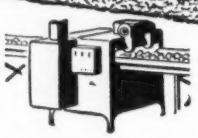
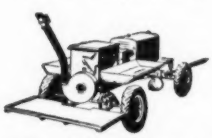
RIVERSIDE DIVISION. Produce Packing Equipment and Protective Processes, Automatic Box Making Machines. Riverside, Cal.

FLORIDA DIVISION... Produce Packing Equipment ... Flavorseal Protection & other processes. Dunedin & Lakeland, Florida.



TEXAS DIVISION. Produce Packing Equipt., Canning Machinery, Flavorseal & other processes for fresh produce. Harlingen, Tex.

FMC's "WATER BUFFALO" amphibious tanks. Seven of FMC's fourteen major plants make amphibious tanks or sub-assemblies.



THE NIAGARA SPRAYER & CHEMICAL CO., INC. DIV. Insecticides. Middleport, N.Y.; Jacksonville, Florida; Burlington, Ont., Can.

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A Tribute to the Memory of a Man ..

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(Excerpt from a letter written to his sons by the late Percy Cecil Magnus, founder of MAGNUS, MABEE & REYNARD, Inc.)

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PURE Vitamins

—products of Merck Research

Merck research has been directly responsible for many important contributions to the synthesis, development, and large-scale production of individual vitamin factors in pure form.

In a number of instances, the pure vitamins may be considered to be products of Merck research. Several were originally synthesized in the Merck Research Laboratories, and others have been synthesized by Merck chemists and collaborators in associated laboratories.

Because most of the known vitamins have now been made available in pure form, effective therapy of specific vitamin deficiencies can be conducted on a rational and controlled basis, under the direction of the physician.

MERCK contributions

1934 — Ascorbic Acid Merck was made available by Merck & Co., Inc.

1936 — Crystalline Vitamin B_1 was synthesized in the Merck Research Laboratories.

1937 — Vitamin B_1 (Thiamine Hydrochloride Merck) was made commercially available.

1938 — Nicotinic Acid Merck (Niacin) and Nicotinamide Merck (Niacinamide) were made available.

1938 — Riboflavin Merck was the second pure crystalline vitamin to reach production during that year.

1938—Alpha-Tocopherol (Vitamin E) was identified and synthesized by Merck chemists and their collaborators in other laboratories.

1939 — Crystalline Vitamin B_6 was synthesized in the Merck Research Laboratories.

1940—Vitamin B_6 Hydrochloride Merck (Pyridoxine Hydrochloride) became available.

1940—Alpha-Tocopherol Merck (Vitamin E) was made commercially available.

1940—Vitamin K_1 Merck (2-Methyl-3-Phytyl-1, 4-Naphthoquinone) was made available.

1940 — Menadione Merck (2-Methyl-1, 4-Naphthoquinone), a pure compound having marked Vitamin K activity, became available.

1940 — Crystalline Pantothenic Acid, member of the Vitamin B Complex, was identified and synthesized by Merck chemists and their collaborators in other laboratories.

1940 — The Calcium Salt of Dextrorotatory Pantothenic Acid was made available by Merck & Co., Inc.

1943—Crystalline Biotin, member of the Vitamin B-Complex, was synthesized in the Merck Research Laboratories.

1944—Biotin Merck was made available by Merck & Co., Inc.

Merck & Co., Inc. now manufactures all the vitamins commercially available in pure form, with the exception of vitamins A and D.

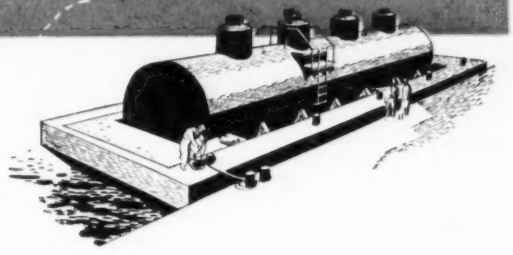
You are invited to write for literature

MERCK & CO., Inc. *Manufacturing Chemists* RAHWAY, N. J.

NEW BARGE
expands transportation facilities for
COLUMBIA CAUSTIC SODA

PIONEER in better transportation of heavy chemicals, Columbia now has in service a barge designed specifically to carry Liquid Caustic Soda. Each trip it makes releases many railroad tank cars—of utmost importance in serving the diversified war industries which are dependent on this chemical.

Columbia's barges for transporting Liquid Caustic and Chlorine now bring numerous areas within economical distance of one of the nation's greatest Caustic Soda—Chlorine plants. Manufacturers, whose processes require these chemicals in volume, may obtain important marketing advantages with plants located strategically in relation to our barge facilities. Information may be obtained on request.



Approximately 500 tons of Caustic Liquor can be transported in the huge welded steel tank of this 135-foot barge. Foamglas insulation protects the Caustic from freezing—a special lining prevents metallic contamination en route. Numerous other unique features are incorporated in the design of this barge. It is now in service from the Columbia operated DPC plant on the Ohio River at Natrium, West Virginia.

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ALLYL CHLORIDE

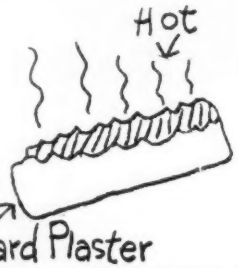
$CH_2 = CH - CH_2 - Cl$

Molecular Weight 76.50

This chemical intermediate is now available in commercial quantities. Under suitable conditions both its chlorine atom and double-bond react readily. In general, it's reactions are rapid . . . show unusual freedom from by-products.

IN SEDATIVES AND ANESTHETICS Allyl Chloride's contribution is a less toxic effect, reduced nausea and rapid action with minimal disturbance to metabolism.

SYNTHETIC MUSTARD OIL is another end use, and here Allyl Chloride provides advantages of low cost.



ALLYL STARCH EXPERIMENTS have shown that low-cost "air-drying" or heat-setting coatings can be made which have hard, but flexible surfaces resistant to heat, chemicals, and weathering.

The polymerizability of many of its derivatives makes Allyl Chloride valuable as a raw material in the manufacture of plastics and synthetic resins.

Your inquiries about this or other Shell Chemical products are invited

SPECIFICATIONS

Purity . . .	Minimum 97% allyl chloride by weight (Impurities are largely beta chloropropylene)
Specific Gravity 20°/20° C.	0.937 to 0.940
Color	Colorless to straw
Distillation Range . . . . (A.S.T.M. D268/33) . .	Below 43° C. None Above 49° C. None
Acidity	Maximum 0.01% calculated as hydrogen chloride
Weight	7.81 lbs. per gallon at 20° C. (approx.)

PHYSICAL PROPERTIES

Several of the physical properties of allyl chloride are given in the following table:

Specific Gravity at 20°/4° C.	0.9374
Boiling Point at 760 mm.	44.9° C.
Melting Point	−134.5° C.
Flash Point, Tag Open Cup	−20° F.
Tag Closed Cup	−25° F.
Vapor Pressure at 0° C.	119 mm. Hg.
10° C.	191 " "
20° C.	296 " "
30° C.	441 " "
Specific Heat	0.315 (0° C.)
Refractive Index, N_D^{20}	1.4151
Coefficient of Expansion . . .	0.000783 per °F.
Heat of Combustion . .	5,940 gm. cal. per gm.

Azeotropic Data: Allyl chloride forms a constant boiling mixture with water at 43.0° C., containing 97.8% by weight of compound.

For further properties and uses communicate with either of the addresses below.

SHELL CHEMICAL Division of **SHELL UNION OIL CORPORATION**
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R. W. GREEFF & CO. *Eastern Sales Agent* 10 ROCKEFELLER PLAZA, NEW YORK 20. TRIBUNE TOWER, CHICAGO 11

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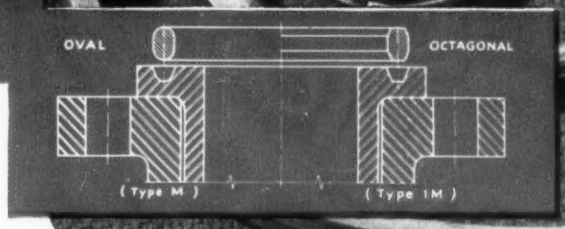

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The Ring-Type Joint, providing an all-solid-metal joint assembly, is fast finding favor in high pressure and temperature steam and chemical processing services.

Goetze V-Tite Gaskets, used almost exclusively by the Petroleum Industry for sealing ring-type joints, are the product of years of mechanical, metallurgical and chemical research.

They are available in Armco Ingot Iron or low carbon steel, 4-6 Chrome Alloy Steel, or any of the several other desirable metals or alloys; in sizes ranging from one to 80 inches in diameter and of standard oval or octagonal shape.

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simplified in production and *reduced* in cost by this

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3. Elimination of copper heading.
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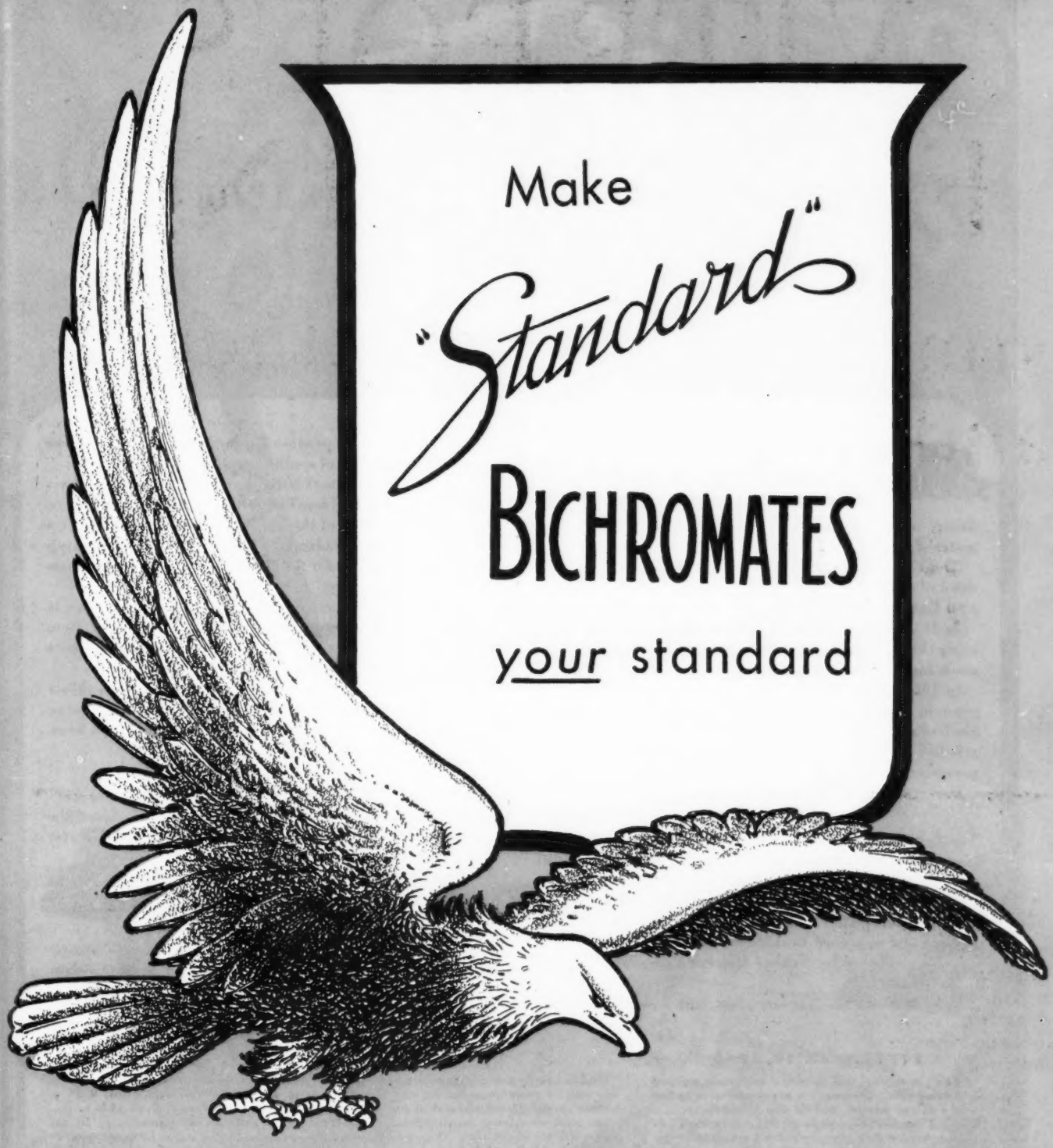
The benefits you derive from these advantages are: Lighter enamel weights and coats... reduction of chippage and mechanical breakage losses... increase in production efficiency through reduction of rework and re-operation... sharply improved thermal shock resistance of white enamel, due to thinner enamel thickness... overall cost reduction for enameled ware... increase in production speed. Even when a ground coat is used this NEW Titanium Steel for Vitreous Enameling brings important manufacturing cost reductions.

Manufacturers of both steel and enameled products may obtain complete factual technical data from a member of our Technical Staff, or by mail. Consult your steel supplier on deliveries.

Pending patent applications on the new enameling process and product made thereby are owned jointly by Inland Steel Company and The Titanium Alloy Manufacturing Company under Trust Agreement.

THE TITANIUM ALLOY MANUFACTURING COMPANY

Executive Offices: 111 BROADWAY, NEW YORK, N. Y. *General Offices and Works:* NIAGARA FALLS, N. Y.



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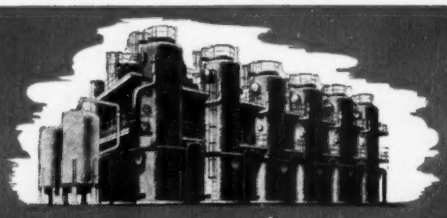
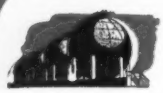


UNION CARBIDE *AGAIN* REPORTS

on the production of

BUTADIENE

for the Government's Synthetic Rubber Program



ONE OF THE MOST IMPORTANT factors in the Government's rubber program is the production of GR-S type synthetic rubber. The basic chemical in this rubber is Butadiene, which can be made from alcohol or hydrocarbon materials.

The Government's original plan provided that about one third of the required Butadiene would be made by CARBIDE AND CARBON CHEMICALS CORPORATION'S alcohol process.

In 1943, their first year of operation, however, the plants using this process produced over 75 per cent of all Butadiene made for GR-S type synthetic rubber.

In 1944, the second year, these plants produced about 64 per cent of all Butadiene necessary for military and essential civilian rubber. This was true despite the fact that good progress had been made in the production of Butadiene by other processes.

THE RECORD

The first tank-car load of Butadiene was shipped from the Government's Carbide-built, Carbide-operated plant at Institute, West Virginia a little over two years ago.

This was just five months after the famous Baruch Committee Report pointed out this nation's desperate need for rubber—and approved Carbide's butadiene alcohol process, originally selected by Rubber Reserve Company, as one of the solutions.

In its first year the Institute plant, with a rated capacity of 30,000 tons per year, produced enough Butadiene for more than 90,000 long tons of synthetic rubber.

Two more great plants using Carbide's alcohol process—and built from the blueprints of the Institute plant—are in full production. One of these, with an annual rated capacity of 30,000 tons of Butadiene is located at Kobuta, Pennsylvania and is operated for the Government by another important chemical company.

The second, with a rated capacity of 60,000 tons a year, is operated for the Government by Carbide at Louisville, Kentucky—making the total rated capacity of the two huge plants now operated by Carbide 110,000 tons a year.

In 1944, the production of Butadiene from the three plants using the alcohol process totaled 361,000 tons—representing operation at over 164 per cent of rated capacity. An even higher rate is expected in 1945.

* * * * *

Before Pearl Harbor, the United States was a "have not" nation with respect to rubber. Now, thanks to American research, engineering and production skill, our country can take its place as a dominant factor among the great rubber producing nations of the world.

▼

Business men, technicians, teachers, and others are invited to send for the book RU-6 "Butadiene and Styrene for Buna S Synthetic Rubber from Grain Alcohol," which explains what these plants do, and what their place is in the Government's rubber program.

SEPTEMBER 10, 1942

"Of all the critical and strategic materials, rubber is the one which presents the greatest threat to the safety of our nation, and to the Allied Cause . . . We find the situation to be so dangerous that unless corrective measures are taken immediately the country will face both a military and a civilian collapse."

—Report of the Rubber Survey Committee (Baruch Committee).

AUGUST 31, 1944

"Undoubtedly the outstanding achievement of your company has been the development of your process for the production of Butadiene from alcohol. With a rather meager background of experimental work, your engineers were able to design and construct commercial units for the production of Butadiene. In an exceedingly short time, the operation of this equipment at capacities up to 200 per cent of rating has been largely responsible for our present safe situation with respect to rubber supplies . . ."

—Letter from Rubber Director Bradley Dewey to CARBIDE AND CARBON CHEMICALS CORPORATION

The material herein has been reviewed and passed by the Rubber Reserve Company, the Defense Plant Corporation, and the War Department.

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INDUSTRIAL GASES AND CARBIDE—The Linde Air Products Company, The Oxweld Railroad Service Company, The Prest-O-Lite Company, Inc.

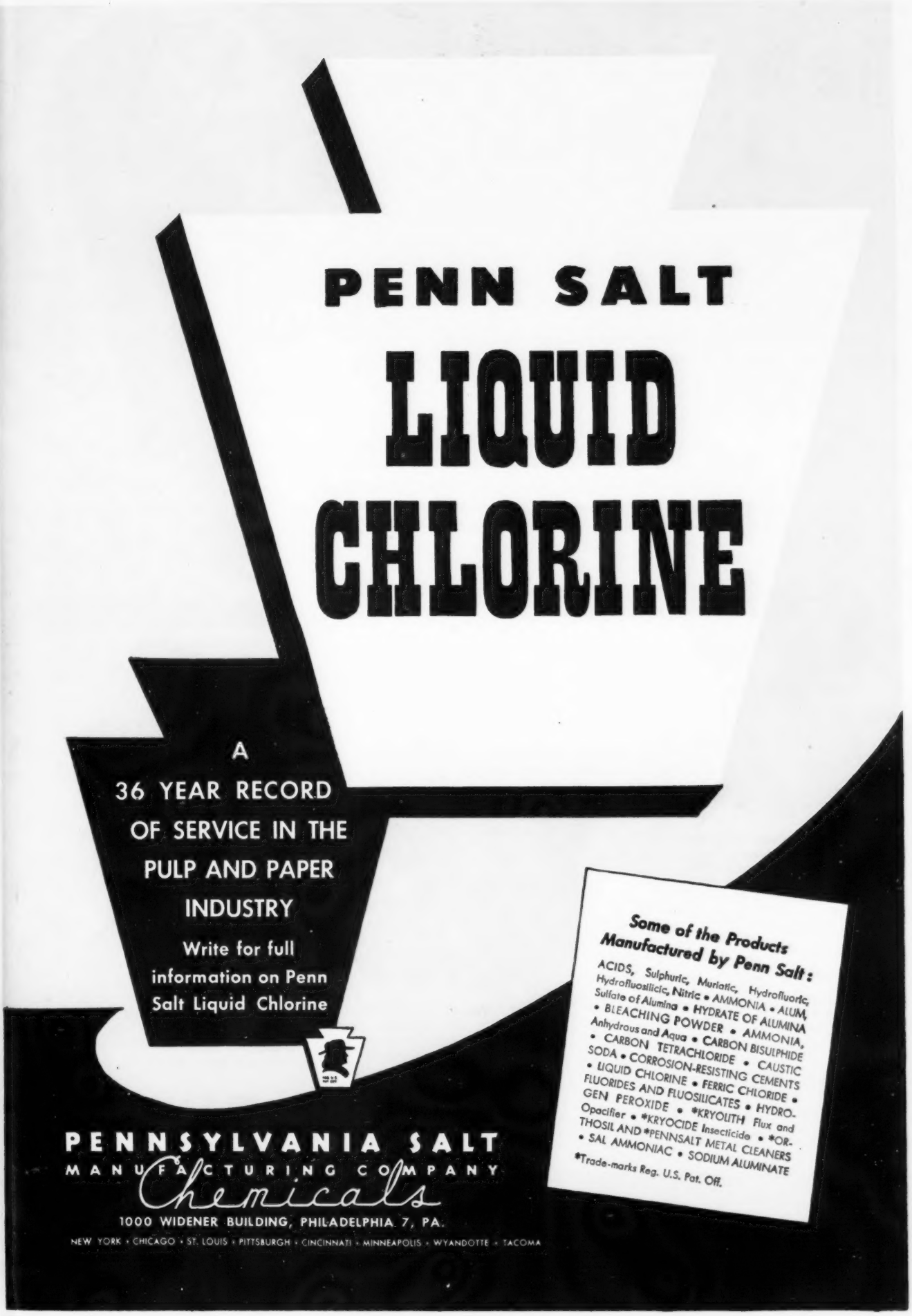
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Fig. 9061WE—Class 900-pound Cast Steel Swing Check Valve, with welding ends and bolted cap. Disc is hung on a 5-degree angle, and when wide open permits full, unobstructed flow through the valve body.

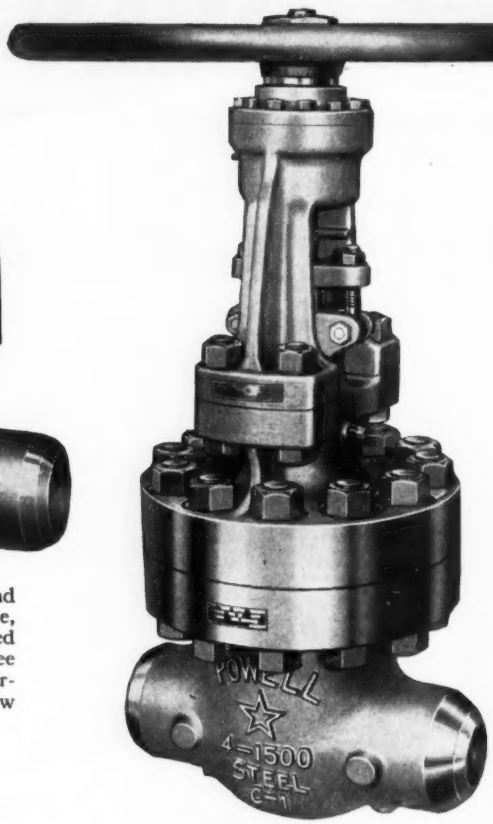

Fig. 1303 WE—Class 1500-pound Cast Steel Gate Valve, with welding ends, outside screw rising stem, bolted flanged yoke and taper solid wedge.

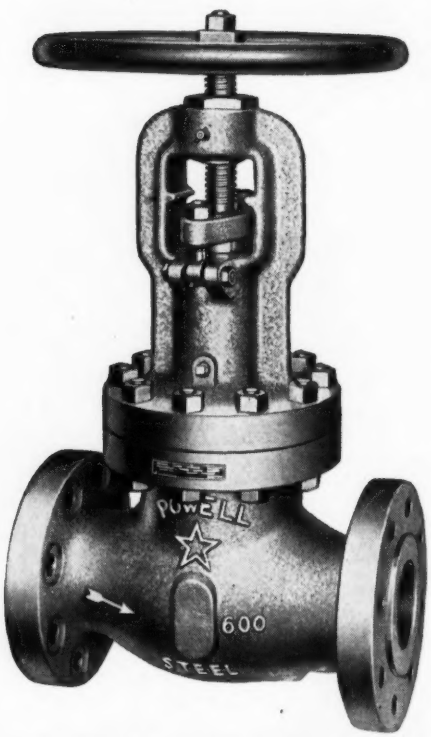

Fig. 6031—Class 600-pound Cast Steel Globe Valve, with flanged ends, outside screw rising stem and bolted flanged yoke.

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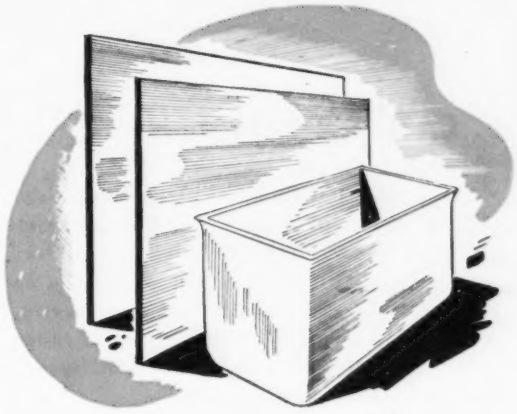
POWELL VALVES

CANVAS FIREMAN. Coatings of Clorafin—Hercules' chlorinated paraffin—provide low-cost flame resistance for canvas awnings, tents, lawn furniture. Clorafin can be applied after weaving or after manufacture into finished products. See next page for details.



THERMOPLASTIC LAMINATES are unique. They are tough, resilient, readily drawn, permit low-cost forming of large shapes from flat laminated sheets. Outstanding are toughness, impact strength, light weight, unlimited color and design effects. See next page.

CUES AND CLUES

for improved products

PLASTIC DOLLS show how Vinsol Resin maintains production despite shortages of rosin, phenolics, shellac, other scarce plastic materials. Turn page for details on this non-critical thermoplastic.

ISOBORNYL CHLORACETATE, a new terpene chemical with interesting possibilities, is now available from Hercules in production quantities. For further details, please turn to next page.

Which of Hercules' hundreds of chemical materials can best improve the performance or processing of your present products, or speed your future developments to completion? Some timely suggestions are presented in this third edition of CUES AND CLUES. Future editions in this magazine will cover many others. For immediate attention on any material, write to Hercules Powder Company, 992 Delaware Trust Bldg., Wilmington, 99, Delaware.

HERCULES

SEE NEXT PAGE FOR DETAILS

1 CANVAS FIREMAN

Clorafin*—Hercules' chlorinated paraffin—is pale in color, exceptionally stable, and low in price. It is available in two grades—a 42% chlorinated product, a viscous liquid; or a 70% chlorinated product, a hard, brittle resin. Clorafin does not oxidize, polymerize, or undergo other changes. It is soluble in a wide range of solvents, and compatible with chemical plasticizers, oils, resins, and chlorinated products.

The outstanding use for Clorafin today is in the production of flame-resistant, water-resistant, and mildew-resistant coatings for canvas and other inflammable materials. It is also used for flameproof paints and adhesives.

Detailed properties, together with tables showing the compatibility of Clorafin with other materials, sent on request. Use coupon.

2 THERMOPLASTIC LAMINATES

Plastic laminates have been known for years. The field of thermoplastic laminates, however, has been largely undeveloped. In impact strength, deep-drawing properties, low temperature flexibility, electrical properties, and range of color, thermoplastic laminates based on cellulose acetate or ethyl cellulose are unexcelled. They are also light in weight.

By simply heating the laminated sheets at temperatures sufficient to soften the binder, they can be drawn into large and intricate shapes in inexpensive dies at low pressures. Sections may be joined together securely merely by heat-sealing or solvent-welding.

To make these new plastic sheets available for evaluation purposes, Hercules is setting up a pilot plant. Sheets will be obtainable, to start, in thicknesses of 1/16 in. and 1/8 in., and up to 50 in. x 50 in. Current investigation is limited to essential needs. Write for further data. Please use coupon.

3 PLASTIC DOLLS

Vinsol* Resin is currently available in quantity. Many manufacturers confronted with shortages of war-scarce resins are making use of this dark-colored, high-melting thermoplastic resin as an extender, modifier, or replacement. In the manufacture of children's dolls and similar plastic objects, for instance, Vinsol Resin serves as a binder. Under moderate heat and pressure, the Vinsol Resin melts and flows to give a composition with the necessary density, hardness, good surface, and easy removal from the mold.

Useful alike in plastics, special paints and sealers, and inks, Vinsol Resin may replace up to 35% phenolic resin without markedly impairing physical properties. Insoluble in petroleum derivatives, it promotes outstanding grease and oil resistance, hence its use in freight-car sealers and similar compositions. To many other applications, it brings excellent electrical characteristics, low water absorption, hardness, thermoplasticity at low cost.

Vinsol Resin is available in quantity at low price, in lump, flake, or pulverized form. You can best determine the material-stretching, money-saving advantages of Vinsol Resin by testing it yourself. Use coupon for further information.

4 ISOBORNYL CHLORACETATE

Hercules' isobornyl chloracetate is a high-boiling liquid, substantially water-white in color, available in technical grade with a purity of 85% or better. It can be subjected to a large number of organic reactions to yield a variety of compounds. Hercules' isobornyl chloracetate is saturated, and, therefore, stable in oxidation. It contains an extremely reactive halogen.

Hercules' isobornyl chloracetate is available now, in production quantity. Typical analysis and sample to facilitate your further investigation may be had on request.

*Reg. U. S. Pat. Off. by Hercules Powder Company

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II-53

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Excerpts from letters acknowledging prompt delivery of Sperry Penicillin Filter Presses

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"It has been a pleasure to work with your organization and it has also been a unique experience for us to deal with a firm that lives up to their promises."

Type of Sperry Filter Press used for Penicillin Production.

WHETHER it is an order for especially designed filter presses to help speed the production of life-saving Penicillin . . . or to meet the innumerable problems of industrial filtration which Sperry engineers are called upon to solve . . . you can be assured a Sperry built press will meet every reasonable requirement as to quality and delivery.

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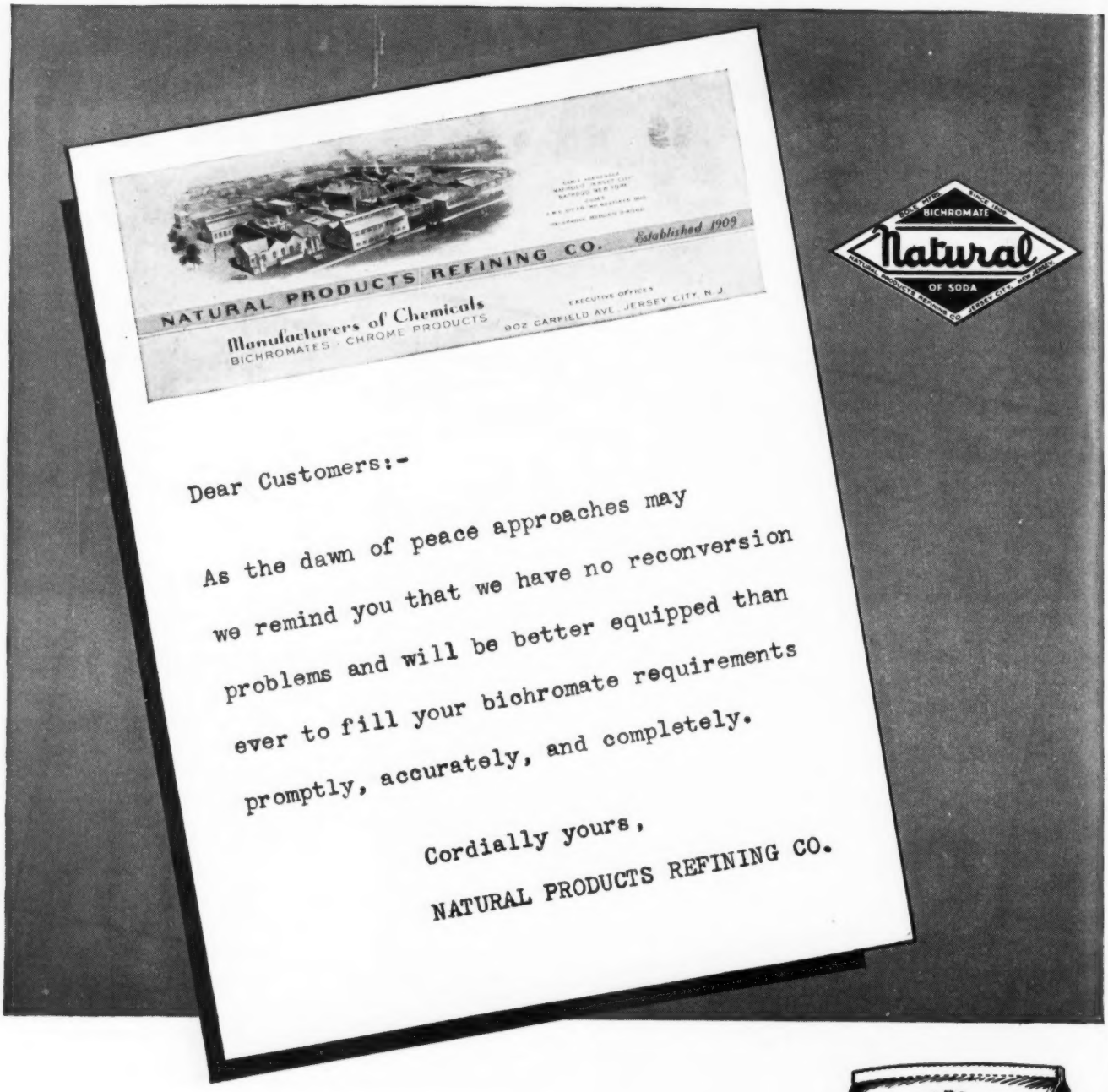
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Editorial

The Fertilizer Feud

by ROBERT L. TAYLOR, editor

THE LONG-STANDING FERTILIZER FEUD in which the fertilizer companies are pitted against the government and the farm bloc, is flaring up again as the time grows nearer for decision on disposal of government war nitrogen plants. The plants at stake have a capacity of 750,000 tons of nitrogen annually as against 700,000 tons now privately owned.

GOVERNMENT CONTROL OF THESE PLANTS, either direct or through government-sponsored cooperatives, is sought as a stick—some say yardstick—to wield over the private fertilizer industry for such alleged sins as inefficiency, overcharging, refusal to sell the kinds of fertilizer wanted by the farmers, and creating artificial scarcities. It is emphasized by the proponents of government control that these practices have prevented the expanded use of commercial fertilizers that is needed to raise the economic status of the farmers and to conserve the soil of the nation. To each of these charges the fertilizer industry has responded with an emphatic denial based on its record and has countered with charges of its own that government and farmers have overestimated fertilizer demands, that farmers refuse to buy new types of fertilizer, and that government has permitted and encouraged subsidized competition in the fertilizer field in the form of tax-exempt cooperatives.

The merits and demerits of both sides of the argument have already been expounded long and eloquently in person and in print. We believe we can add nothing new to what has been said, other than register our own thorough conviction that private industry *can* make better fertilizer and do it more cheaply than government.

WHAT WE DO WANT TO SAY, however, as emphatically as we can, is that never has there been a dispute where the participants had more to gain by sitting down around a conference table for a give and take of ideas, constructive criticism and *mutual planning*.

Here we have a great national resource at stake—the soil. Every party to the argument is interested in one thing—to get more commercial fertilizer into the soil where it is needed—farmers for economic reasons, government for conservation reasons, and fertilizer manufacturers because it means selling more fertilizer. What better common ground could there be on which representatives of these three great groups could meet for a real hairdown session? Perhaps farmers *haven't* been as receptive as they should to new fertilizers, perhaps government *hasn't* done all it could to encourage and guide farmers in the economical use of fertilizers, perhaps the fertilizer industry *hasn't* been as progressive as it could in serving the needs of the farmers.

Certainly if we have learned anything from our experiences in this war, it is that cooperation and mutual understanding between government and the various private groups in our industry and agriculture can far outstrip any production records that totalitarian methods have yet turned in. Why cannot the fertilizer feud, including disposition of the war nitrogen plants, be settled peaceably and to the satisfaction and profit of all through the conference table method?

Martin Hill Ittner 1870-1945

THE CHEMICAL PROFESSION lost a leader and beloved friend last month with the death of Martin H. Ittner, for 49 years chief chemist of Colgate-Palmolive-Peet Co.

In addition to his scientific accomplishments in the field of soap and glycerine, for which he was cited as a Modern Pioneer in 1940 and awarded the Perkin Medal of the Society of Chemical Industry in 1942, Dr. Ittner was an active participant in chemical professional affairs, having served as president of the American Institute of Chemical Engineers and the Chemists Club of New York and as chairman of the New York Section of the American Chemical Society.

To those who have had the privilege of knowing him and of associating with him in his many good works, Dr. Ittner will remain an inspiring memory.

Franklin Delano Roosevelt 1882-1945

American Synthetic versus German

IT IS BEGINNING TO LOOK AS THOUGH American industrial genius and research have beat the Germans in their own field of synthetic rubber manufacture. The synthetic rubber produced by American plants after development by American scientists is known to be better than the German product, or at least what we know of the German synthetic. Not only that, the plants on this side, and the utilization of the synthetic in various materials, are believed to be better.

German Postwar Plans

THEIR DAY OF MILITARY AGGRESSION OVER, the Germans are attempting subtle preparations to continue a commercial war from bases outside Germany, according to a State Department report:

"Reliable data collected by Allied Governments clearly indicate," says the Department, "that Nazi party members, German industrialists and the German military . . . are now developing postwar commercial projects, are endeavoring to renew and cement friendships in foreign commercial circles, and are planning for renewals of prewar cartel agreements. An appeal to the courts of various countries will be made early in the postwar period, through dummies, for 'unlawful' seizure of industrial plants and other properties taken over by Allied governments at the outbreak of war. In cases where this method fails German repurchase will be attempted through 'cloaks' who meet the necessary citizenship requirements.

"The object in every instance will be to re-establish German *control* at the earliest possible date. German attempts to continue to share in the control and development of technological change in the immediate postwar period is reflected in the phenomenal increase in German patent registrations in foreign countries during the past two years. These registrations reached an all-time high in 1944. The prohibition against exporting capital from Germany was withdrawn several months ago, and a substantial outflow of capital has followed to foreign countries.

"German technicians, cultural experts, and undercover agents have well-laid plans to infiltrate foreign countries with the object of developing economic, cultural and political ties. German technicians and scientific research experts will be made available at low cost to industrial firms and technical schools in foreign countries. German capital and plans for the construction of ultra-modern technical schools and research laboratories will be offered at extremely favorable terms since they will afford the Germans an excellent opportunity to design and perfect new weapons. This Government is now in possession of photostatic copies of several volumes of German plans on this subject."

These plans could have sinister meaning for the American chemical industry as well as the peace of the world. Germans and German sympathizers will have great difficulty getting a foothold in the control of industry in any of the Allied nations. But what about the neutral countries? Does the flight of German capital, the foreign registration of German patents, mean that we will see a German chemical industry grow up outside Germany? Does it mean that German methods of doing business will again dominate Europe? Or will the neutrals fall into a world line-up against Germany?

These are all questions that are up to the peacemakers and the future. Complete answers may not emerge for months or years. But they are questions of very direct interest to American chemical companies with postwar export plans and will bear watching accordingly.

Government, Too, Is Human

A WAR PRODUCTION BOARD ADMINISTRATOR drove home a point recently which seems to us to make a lot of sense.

"Many of industry's complaints about the way some things have been done in government wartime agencies are justified," he said, "but likewise much of the blame for bad decisions must fall right back on industry. Government knows only as much as it is told. No one knows better the impossibility of omniscience than the responsible government official, which is why we are always asking you fellows in industry for information and guidance. Our job is tough enough when we have all the facts, impossible when we haven't. Yet it is appalling how reluctant some companies are to cooperate in supplying data on which we can base sound decisions. We are all too frequently in the embarrassing position—despite our best efforts to the contrary—of a judge attempting to hand down a verdict without first having all the evidence."

Most members of business and industry readily admit that government controls are necessary in wartime. Criticism has been not so much of the principle of control as of the method and extent of the controlling. Thus it seems that we in industry are under obligation at least to do our part to make the controls workable.

It is, for example, our responsibility to register objections to contemplated orders which, if put into effect, might adversely affect our ability to serve the war effort. If we believe an order is bad, we are shirkers if we merely accept it and grumble.

Where data are requested, it is up to us to provide them as quickly as possible. However, if we feel that requests are unreasonable, or too frequent, or too demanding, that information, too, should be transmitted to the proper officials.

Most of the wartime government agency people are eager for information and constructive criticism that will help them do a tough job better. Let us in industry not lose sight of our obligation to provide this. It is an important part of our wartime job, and is one of the principal ways we can get better administration of industry matters in Washington.

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Paper is a No. 1 war material shortage, because over 700,000 different war items are wrapped, packaged, labeled, tagged, or made of paper or container board.

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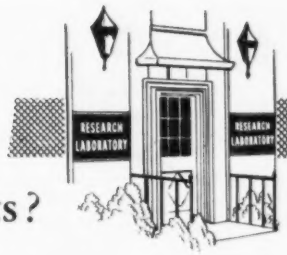
Have You Investigated the Possibilities of These Two New Columbia Products?



BUTADIENE MONOXIDE AND DIGLYCOL CHLOROFORMATE

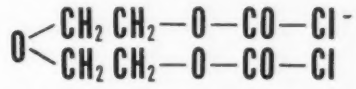
Introduced earlier this year, Butadiene Monoxide and Diglycol Chloroformate are already the subjects of experiments in many industrial laboratories.

In the event you have not investigated the possibilities of these new materials, a brief description is repeated:

BUTADIENE MONOXIDE

Butadiene Monoxide (3,4-Epoxy-1-butene) (Vinylethylene Oxide) is a colorless, relatively volatile, liquid organic compound possessing both carbon to carbon unsaturation and an alpha-epoxide group. The reactions characteristic of these two organic groups render this compound useful in diverse organic processes, such as the production of polymerizable alkyd resins, unsaturated alcohol ethers and esters. They suggest interesting possibilities in a variety of other organic chemical products and pharmaceuticals.

DIGLYCOL CHLOROFORMATE



Diglycol Chloroformate [Diethylene Glycol Bis(chloroformate)] is a new chemical intermediate to fill the need for a non-volatile, relatively easily handled organic dibasic acid chloride. It is reactive, for example, with alcohols or amines to form other organic intermediates and derivatives . . . suggesting important applications in the fields of pharmaceuticals, rubber, paints, resins and plastics.

TECHNICAL DATA AND SAMPLES AVAILABLE

If you are interested in investigating the usefulness of either or both of these materials for your own products, write to our General Sales Offices for Technical Bulletins. Then, if the properties and characteristics described indicate potentialities for your business, samples may be obtained for laboratory experimentation.

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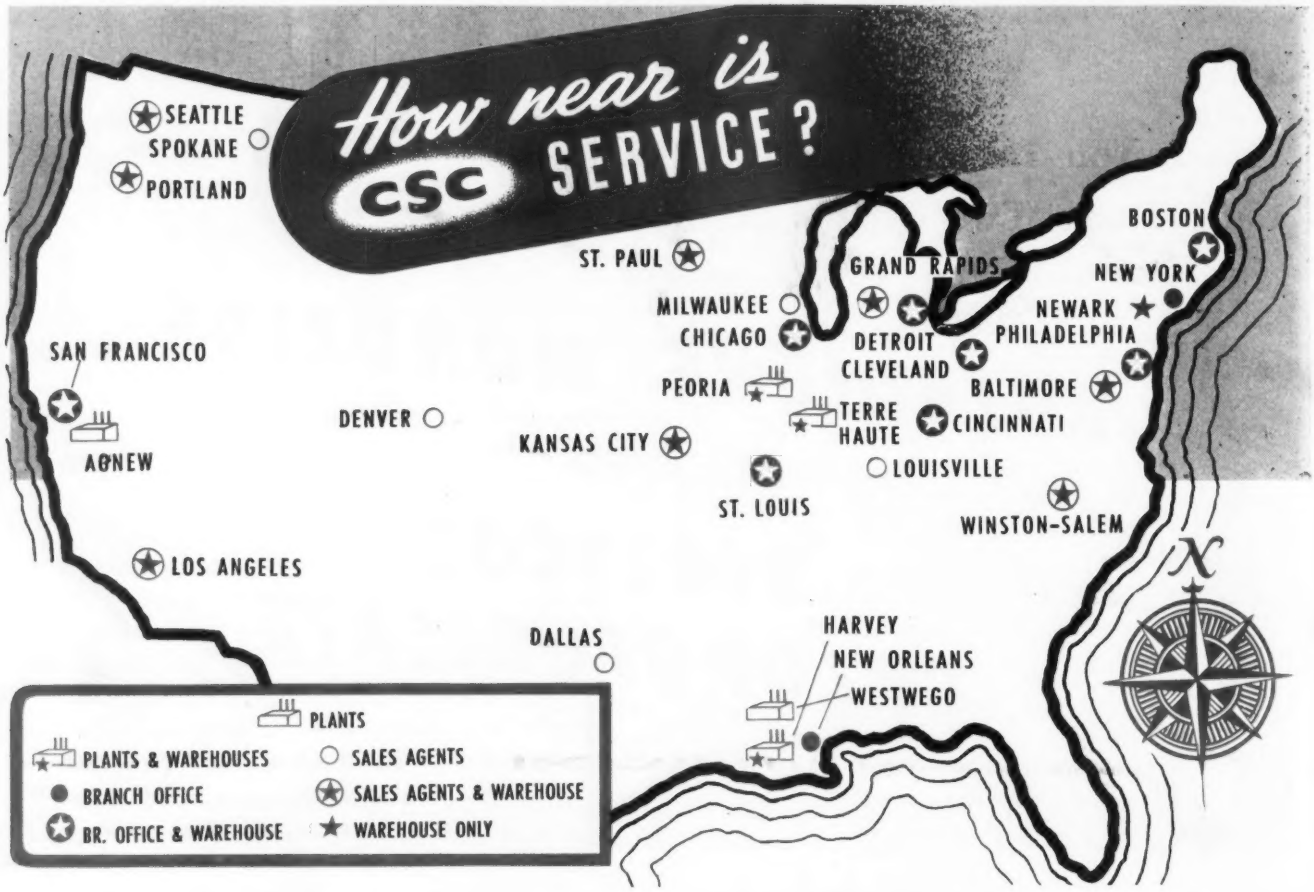

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CHEMICAL COMPANY OPERATIONS in 1944

by MICHAEL PESCATELLO
Carnegie Corporation of N. Y., New York, N. Y.

OPERATING FIGURES OF THE PRINCIPAL CHEMICAL COMPANIES for the year 1944 indicate that the high volume of production stimulated by the demands of war has levelled off. Aggregate sales and net income showed a very slight increase over 1943, while federal taxes held about even.

LAST year the chemical industry, as represented by a group of twenty-seven major companies, attained new records of achievement. The accompany-chart summarizes the principal data covering the prewar year 1939 and the last two calendar years 1943 and 1944. The amount of goods sold by these companies reached a new high of $2.3 billion last year. This represents an increase of $1.3 billion or 134 per cent over sales reported for the year 1939.

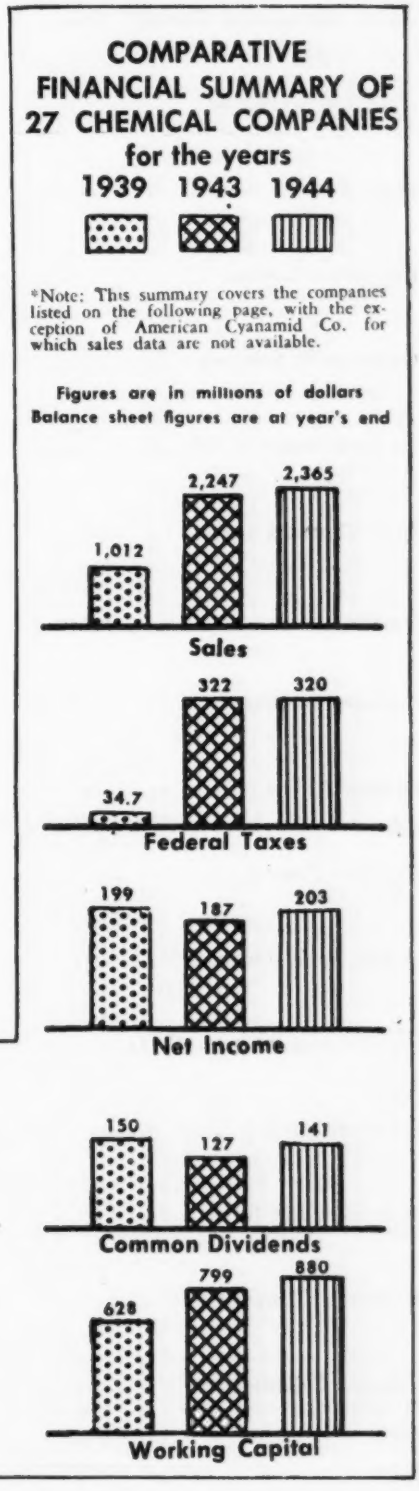
The very material expansion of output of chemical products since 1941 probably reached its peak last year. As the end of hostilities in Europe approaches, the decline in production of goods needed by the armed services is likely to be greater than (1) the stepped-up requirements in the Pacific theatre of war and (2) the increase in output of chemicals and products for civilian uses.

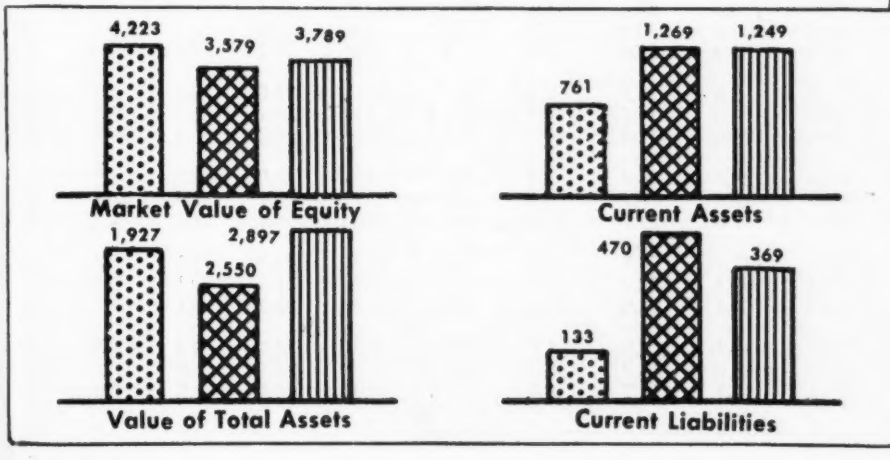
While producing more than twice as much in 1944 as in 1939, these companies increased their total assets by $970 million or 50 per cent. Every dollar of assets last year accounted for approximately 82 cents of sales compared to 52 cents in the year 1939 and 88 cents in 1943.

CURRENT POSITION

One of the most significant changes occurring in the financial status of these companies in the years since 1939, is in their current position. Between 1939 and 1944 total current assets increased by close to $500 million or 64 per cent. The rate of increase of liquid assets was greater than that of total assets. In view of the much greater demands on productive facilities the cause of this rise is readily apparent. This is to say, there has been a considerably greater amount of raw materials, semi-finished and finished goods entering into and coming out of the manufacturing processes than can be expected in more normal times. The effect of this is to boost current assets. But, in addition to the enlarged inventory requirements there is also a greater flow of cash induced by the high rate of production.

On the liability side of current position it is significant to note that current liabili-





TWENTY-EIGHT CHEMICAL COMPANIES---COMPARISON 1944, 1943 AND 1939

	Year	Year End: Market Value of Equity	Year End: Total Assets	Year End: Current Assets	Year End: Current Liabilities	Year End: Working Capital	Sales	Federal Taxes	Net Income	Common Dividends
					(Millions of Dollars)					
Air Reduction	1939	$146.1	$44.2	$20.0	$3.4	$16.6	$27.6	$1.0	$5.1	$3.8
	1943	108.5	69.6	34.5	16.5	18.0	94.1	12.6	6.5	5.4
	1944	**109.5**	**90.3**	**53.1**	**18.9**	**34.2**	**97.9**	**10.7**	**5.9**	**5.4**
Allied Chemical & Dye	1939	391.8	236.6	108.1	12.5	95.6	167.9	4.5	21.0	19.9
	1943	327.6	288.6	158.8	36.3	122.5	285.3	20.4	19.0	13.3
	1944	**336.5**	**294.1**	**175.4**	**35.2**	**140.2**	**274.1**	**20.6**	**18.0**	**13.3**
Amer. Agricultural Chemical (1)	1939	12.5	21.5	14.3	0.8	13.5	17.5	0.06	0.7	0.9
	1943	**18.8**	**27.1**	**19.0**	**4.0**	**15.0**	**30.0**	**1.7**	**2.0**	**1.1**
	1944	**17.6**	**29.3**	**20.5**	**5.6**	**14.9**	**33.0**	**2.9**	**1.8**	**1.3**
American Cyanamid	1939	89.0	77.3	39.4	9.0	30.4	....	1.1	5.5	4.2
	1943	106.6	152.2	101.3	47.1	54.2	....	20.0	6.8	3.6
	1944	**105.6**	**138.9**	**86.8**	**31.9**	**54.9**	....	**12.0**	**6.7**	**3.9**
Atlas Powder	1939	16.0	22.4	9.4	1.3	8.1	16.5	0.3	1.3	0.7
	1943	14.3	38.8	24.6	13.0	11.6	39.9	4.1	1.7	0.8
	1944	**15.4**	**36.7**	**22.9**	**10.9**	**12.0**	**45.0**	**3.1**	**1.7**	**0.8**
Columbian Carbon	1939	49.9	30.6	7.8	1.6	6.2	15.1	0.5	2.8	2.4
	1943	47.2	35.2	11.9	2.4	9.5	21.1	1.4	3.1	2.1
	1944	**51.1**	**37.2**	**13.4**	**3.4**	**10.0**	**23.6**	**1.8**	**3.2**	**2.1**
Commercial Solvents	1939	36.9	20.0	13.8	2.5	11.3	14.4	0.2	1.6	...
	1943	39.5	29.9	21.8	6.0	15.8	47.2	6.9	2.9	1.6
	1944	**42.2**	**28.7**	**19.6**	**4.1**	**15.5**	**65.2**	**5.9**	**2.5**	**1.9**
Davison Chemical (1)	1939	3.5	11.7	6.1	0.3	5.8	9.4	0.01	0.3	
	1943	7.1	15.2	7.9	2.0	5.9	21.6	0.9	1.3	0.5
	1944	**8.2**	**15.4**	**8.7**	**1.7**	**7.0**	**25.4**	**1.1**	**1.4**	**0.5**
Dow Chemical (2)	1939	148.6	41.8	14.3	2.6	11.7	26.7	0.7	4.2	2.9
	1943	162.3	119.0	35.9	31.1	4.8	105.4	18.2	8.2	3.7
	1944	**152.3**	**139.6**	**60.8**	**23.1**	**37.7**	**120.4**	**14.1**	**8.6**	**3.7**
Dupont (3)	1939	2013.9	735.8	209.3	47.1	162.2	298.8	14.1	93.2	77.3
	1943	1555.4	903.5	310.4	107.6	202.8	585.4	118.3	69.7	47.2
	1944	**1721.9**	**1170.0**	**288.5**	**60.9**	**227.6**	**622.1**	**116.8**	**80.8**	**58.3**
Freeport Sulphur	1939	26.2	23.2	13.1	2.1	11.0	9.0	0.2	2.2	1.2
	1943	24.8	28.0	18.7	4.0	14.7	17.2	0.9	2.5	1.6
	1944	**27.2**	**29.8**	**20.9**	**4.8**	**16.1**	**18.8**	**1.4**	**2.6**	**1.6**
General Airline (4)	1939	40.7	61.4	33.9	4.4	29.5	25.8	0.7	4.5	1.7
	1943	38.1	69.4	37.2	7.6	29.6	58.8	9.0	3.6	
	1944	**44.8**	**70.0**	**40.2**	**9.8**	**30.4**	**73.3**	**12.1**	**4.8**	**1.5**
Hercules Powder	1939	117.1	49.1	21.7	3.0	18.7	41.0	1.3	5.3	3.7
	1943	106.6	96.5	58.6	30.7	27.9	122.5	17.7	5.7	3.3
	1944	**109.3**	**87.8**	**49.5**	**19.5**	**30.0**	**105.7**	**11.7**	**4.8**	**3.3**
Hilton Davis Chemical (1)	1939	2.3	2.3	0.9	0.1	0.8	2.2	0.03	0.2	0.07
	1943	2.0	4.4	2.2	0.9	1.3	6.3	0.3	0.2	0.1
	1944	**2.8**	**4.3**	**2.4**	**0.9**	**1.5**	**7.7**	**0.3**	**0.2**	**0.1**
Int'l Mineral & Chemical (1)	1939	0.8	27.2	6.5	0.4	6.1	11.7	...	0.1	..
	1943	7.0	33.4	8.8	2.2	6.6	22.4	1.2	2.1	0.5
	1944	**8.8**	**33.6**	**9.9**	**1.3**	**8.6**	**27.3**	**0.6**	**2.0**	**0.5**
International Salt	1939	8.6	13.5	2.9	0.3	2.6	7.0	0.1	0.5	0.4
	1943	9.6	14.1	4.1	1.1	3.0	10.1	1.6	0.7	0.6
	1944	**10.6**	**14.5**	**4.7**	**1.7**	**3.0**	**10.3**	**1.6**	**0.6**	**0.5**
Mathieson Alkali	1939	24.8	24.8	4.5	0.8	3.7	10.9	0.2	1.1	1.2
	1943	17.3	27.4	9.8	2.6	7.2	18.2	1.6	1.3	0.8
	1944	**19.8**	**27.7**	**11.6**	**2.4**	**9.2**	**18.4**	**1.1**	**1.3**	**0.8**
Monsanto Chemical	1939	135.3	54.7	20.7	5.9	14.8	42.9	1.5	5.4	3.7
	1943	99.3	72.2	32.4	7.2	25.2	81.6	10.1	5.3	2.8
	1944	**101.4**	**76.8**	**36.1**	**7.9**	**28.2**	**86.9**	**10.1**	**5.1**	**2.8**
National Cylinder Gas	1939	12.2	6.9	1.7	0.5	1.2	4.9	0.2	1.0	0.5
	1943	16.0	16.7	6.8	3.6	3.2	26.6	4.7	2.1	1.1
	1944	**17.3**	**18.7**	**8.6**	**1.7**	**6.9**	**24.8**	**3.7**	**1.8**	**1.1**

TWENTY-EIGHT CHEMICAL COMPANIES---COMPARISON 1944, 1943 AND 1939

	Year	Year End: Market Value of Equity	Total Assets	Current Assets	Current Liabilities	Working Capital	Sales	Federal Taxes	Net Income	Common Dividends
					(Millions of Dollars)					
Newport Industries	1939	8.0	5.6	2.7	0.4	2.3	4.5	0.08	0.4	
	1943	11.1	6.7	3.2	0.9	2.3	9.4	1.3	0.7	0.5
	1944	**11.8**	**6.5**	**2.9**	**0.7**	**2.2**	**8.8**	**0.7**	**0.5**	**0.5**
Pennsylvania Salt Mfg. (1)	1939	25.2	16.7	7.9	0.9	7.0	9.5	0.3	1.3	0.7
	1943	23.8	24.3	9.6	4.4	5.2	26.5	2.6	1.4	1.0
	1944	**28.5**	**23.9**	**10.0**	**3.4**	**6.6**	**26.1**	**2.3**	**1.5**	**1.0**
Texas Gulf Sulphur	1939	126.7	61.9	30.5	2.1	28.4	20.8	1.1	7.8	7.7
	1943	134.4	66.8	39.5	7.9	31.6	28.3	6.4	7.9	8.6
	1944	**138.2**	**67.9**	**41.7**	**8.9**	**32.8**	**32.5**	**7.1**	**9.6**	**9.6**
Union Carbide & Carbon	1939	807.1	336.8	133.4	22.6	110.8	170.3	6.6	35.8	18.3
	1943	742.2	459.4	248.1	115.5	132.6	488.4	74.9	32.8	27.8
	1944	**742.2**	**481.2**	**290.4**	**128.4**	**162.0**	**505.0**	**83.3**	**37.7**	**27.8**
United Carbon	1939	23.8	16.4	3.6	0.8	2.8	8.5	0.4	1.5	1.2
	1943	25.8	19.7	5.1	1.7	3.4	11.3	1.0	2.0	1.2
	1944	**26.2**	**20.6**	**5.6**	**1.9**	**3.7**	**13.5**	**1.1**	**2.2**	**1.2**
U. S. Industrial Chemicals (5)	1939	8.9	13.8	9.8	2.3	7.5	11.9	..	0.08	
	1943	13.1	29.1	14.5	4.9	9.6	29.7	1.3	1.2	0.6
	1944	**14.7**	**32.4**	**18.2**	**7.1**	**11.1**	**37.5**	**1.7**	**1.7**	**0.8**
Victor Chemical Works	1939	20.8	8.7	3.6	0.8	2.8	8.3	0.2	1.1	0.9
	1943	15.7	10.3	5.6	0.8	4.8	14.5	2.0	1.1	0.8
	1944	**18.7**	**11.0**	**6.4**	**0.8**	**5.6**	**14.9**	**1.7**	**1.1**	**0.8**
Virginia-Carolina Chemical (1)	1939	1.9	25.5	10.8	1.6	9.2	16.8	0.08	0.5	
	1943	1.9	29.3	16.6	2.1	14.5	26.4	1.0	0.9	
	1944	**1.9**	**30.7**	**18.0**	**3.5**	**14.5**	**29.3**	**2.1**	**0.8**	
Westvaco Chlorine	1939	12.5	13.1	3.9	0.6	3.3	10.8	0.3	1.3	0.6
	1943	9.1	14.9	5.7	0.7	5.0	18.1	0.8	1.2	0.5
	1944	**9.9**	**18.5**	**9.6**	**0.9**	**8.7**	**18.4**	**0.4**	**1.0**	**0.5**

(1) Year or year ended June 30.
(2) Year or year ended May 31.
(3) The value of Du Pont's investment of 10,000,000 shares of General Motors common stock and the income derived therefrom was as follows:

	Stated Value Dec. 31	Income Received
1939	$197,000,000	$35,000,000
1943	231,500,000	20,000,000
1944	247,000,000	30,000,000

(4) Equity value is represented by the 527,667 "A" shares outstanding in 1944, 529,701 in 1943 and 529,693 in 1939.
(5) 1944 and 1943 data are for year or year ended March 31 except value of equity.

ties increased much more than current assets. Between 1939 and 1944 this increase amounted to 177 per cent or a rate almost three times as great as the increase in current assets in the same period.

Expanding operations always place a strain on financial positions because commitments are made well in advance of the time when products are in the hands of consumers. Furthermore, during the war period tax liabilities incurred at the high rates now prevailing require a substantial portion of the cash assets. The chemical industry as reflected by this sample of twenty-seven companies has experienced a heavy call on its working assets. From the end of 1939 to December 31, 1944, the working capital of these companies increased by $251.9 million or 40 per cent. Current assets, however, when related to current liabilities fell from a ratio of 5.7 to 1 at the end of 1939 to 3.4 to 1 at the end of 1944. These companies presently find themselves in a very good financial position although their status in this respect has deteriorated to some extent from the excellent position at the end of 1939.

Comparison of 27 Chemical Companies for the Years 1939, 1943, 1944
(Figures are in millions of dollars)

Year	Year end: Market Value of Equity	Value of Total Assets	Current Assets	Current Liabilities	Working Capital	Sales	Federal Taxes	Net Income	Common Dividends
1939	4,223.6	1,927.2	761.3	133.0	628.3	1,012.1	34.7	199.9	150.3
1943	3,579.9	2,550.9	1,269.3	470.1	799.2	2,247.6	322.9	187.5	127.6
1944	3,789.3	2,897.2	1,249.6	369.4	880.2	2,365.9	320.0	203.2	141.7
% Change, 1939 to '44	−10	+50	+64	+177	+40	+134	+822	+1.6	−6

Note: The above summary excludes American Cyanamid Co. for lack of sales data.

There is an interesting contrast between this large group of chemical companies and all U. S. corporations in respect to their current position. Estimates compiled by the Securities and Exchange Commission show that the ration of current assets to current liabilities at the end of 1939 was 1.8 to 1. At the end of September 1944 the ratio was practically unchanged at 1.9 to 1. These figures would appear to indicate that the drain on chemical companies' current resources was of much greater degree than on all U. S. corporations combined. Also apparent is the fact that the chemical industry keeps itself in much better financial shape than industry in general.

NET INCOME

Although there was a very substantial increase in total assets and net sales between the years 1939 and 1944, the twenty-seven companies reviewed in this

study were able to show an increase in net income of only 1.6 per cent. Net income rose from $200 million reported in the year 1939 to $203.2 million last year. From the standpoint of earnings the 1944 results compared with 1939 were negligible despite the material increase in output, working assets and fixed plants and equipment.

One need not go very far in a search for the reason. Federal taxes have been by far the largest single influence in keeping earnings at pre-war levels. For the year 1939 twenty-seven chemical companies paid a total of $34.7 million in federal taxes. Last year such taxes had sky rocketed to $320 million or an increase of 822 per cent.

The amount paid out to stockholders was lower by $8.6 million last year than in 1939. The increase from 1943 to 1944 was due largely to a larger payment by DuPont reflecting an increase in that company's dividend receipts ($10 million) from its investment in General Motors common stock.

At the end of this year, the market value of all the common stocks of the twenty-seven companies totalled $3.7 billion. This figure was lower by $434 million, or 10 per cent, than the value of these same equities at the end of 1939. Thus it is apparent that there is still a considerable amount of investor uncertainty with respect to future prospects of company earnings. This same apprehension was present at the end of 1943.

Market value of all the equities of these companies showed an increase of 6 per cent at the end of last year over the previous year, or approximately $209 million. But total assets alone increased during this one year period by $347 million.

It is expected that when industry can return to full production of peacetime products there will be a prospectively large postponed demand to be filled. Undoubtedly the demand for chemical products in the postwar period will be larger than in the years prior to the war. The market for such goods will be, according to all indications, permanently larger. The chemical industry, too, is perhaps better able to keep its costs under control than are many other industries. But the tax gatherer has come to share in a very big way, and on a priority basis as always, the earnings of industry. Until it can be known what the tax gatherer's plans are for the future, the investor appears to be taking the attitude that it is better to be pleasantly surprised than rudely disappointed.

During the present year the chemical industry will be faced with the task of at least partial reconversion. Events could move fast enough to make possible the start of full reconversion by the end of this year. For most companies there do not appear to be any difficult problems relating to the shift of productive activities from war to civilian goods. Except in special cases the changeover will represent a shift in use, that is from war to civilian purposes. Such things as Freon, phthalic anhydride, and nylon will be utilized wholly for civilian consumption rather than entirely or in part for war uses as at present. From the financial standpoint there is little question that the chemical indusry can make the changeover about as easily as can any group of industrial companies and perhaps easier.

Disposal of Flammable Wastes by Burning

by A. L. COBB, Eastman Kodak Co., Rochester, N. Y.

THERE are many wastes from industrial plants, particularly from chemical plants, which are not soluble and cannot be disposed of by ordinary dumping because of the high hazards. In many cases the only satisfactory method of disposal is by burning, a method which involves hazards and which requires considerable care if real trouble is to be avoided.

Where the waste is a flammable liquid with little suspended matter, it may be possible to use it in an oil burner as boiler fuel. If the suspended matter is high, however, or the waste is unsuitable for oil burner use for any other reason, it is usually burned in the open. This may be done in open pits in large open areas or in open containers to prevent spreading. In no case should containers with a restricted orifice be used because of the possibility of a vapor explosion.

Operation of a burning ground requires considerable care. It should be remote from plant building and neighboring structures subject to fire damage and should be located on firm, natural soil lightly covered, if desired, with cinders. It should not be on loosely filled ground as the flammable liquids may soak into the ground and remain for considerable periods.

The location should be selected with the prevailing wind in mind, and liquids burned only when the prevailing winds are favorable. Shelter for men doing the work, fire extinguishers to take care of any possible spread of fire beyond the area, telephone and first aid equipment which might be needed in event of fire in clothing, should all be provided. Men doing this work require training to avoid the hazards. Lighting torches should be provided with long handles. Care is needed to avoid a flash fire hazard which might result from too large quantities of flammable liquids being spread on the ground and allowed to evaporate some time before ignition. Free running liquids should be left in open top containers in shallow pits rather than spilled in the pits.

VISCOUS MATERIALS

Similar precautions should be taken with the viscous materials such as rubber cement, nitrocellulose dopes and paints. These are hard to handle in containers, and it will be found desirable to have scrap collecting cans made of fairly heavy construction, although old drums can be used if available. These containers should be kept covered on the truck until arrival at the burning ground when they may be laid on sides with covers removed. No attempt should be made to clean such viscous materials from the scrap containers as this involves considerable hazard, but the containers should be burned out. A number of such containers may be laid on the ground, and a pile of ordinary combustibles laid to a safe point from which the fire may be started.

Many of the materials arriving at the burning ground burn slowly and give off toxic fumes. These should be thoroughly surrounded with rapidly combustible material so as to insure thorough burning. Where toxic materials may be given off, it becomes more important than ever to choose a location well removed from other plants and from residential areas, where the prevailing winds will carry off any fumes. Some of these materials will cause damage to crops and live stock so that farms should also be considered.

To take care of daily burning, the field should be divided into sections, and the use rotated so there is no fire remaining in the section on which flammable materials are to be dumped. The best way is to have four or more separate fields and to rotate their use, and it is good practice to wet down the area with a sprinkler after completing the day's burning to insure the extinguishment of remaining embers and to cool heated metal.

EXPLOSIVE WASTE

A final type of material handled in this manner is explosive waste. The disposal of wastes from explosive plants is a serious problem and in some instances is the direct responsibility of the safety department. Usually there are several fields, and explosive waste is piled in restricted quantity, not over fifty pounds in any one pile. Excelsior filled paper streamers are frequently used as fuses leading to the piles. Trucks bringing waste containers to the burning ground must be thoroughly washed down and the waste water strained to remove the explosives.

Condensed from a paper presented before the 33rd National Safety Congress, 1944.

The author with his odor evaluation block

Improving the Odor of Air

by E. C. CROCKER
Arthur D. Little, Inc., Cambridge, Mass.

THE PROBLEM OF DEODORIZATION is not primarily chemical, in spite of misconceptions to that effect which have become prevalent lately. Most of the effective methods depend upon air scrubbing or adsorption, although some chemicals, such as formaldehyde, perfume materials, and oxidizing agents have a definite but limited value if they are properly used.

WE BECOME conscious of odor in the air whenever its intensity or its nature changes suddenly. Perhaps the wind brings a puff of odor from an unaccustomed quarter, or again, we may walk into a smoke-filled room. In these instances the rapid increase in odor may arouse conscious attention. Even when not consciously aware of a change in odor, subconsciously we may be affected by it, pleasantly or otherwise.

If the scent is notably pleasant, we inhale deeply and tend to luxuriate in the aroma. Automobile salesmen, when they had the cars to sell, would often lightly perfume the interiors of demonstration models to put a prospective lady customer into a favorable mood. She usually wasn't aware of the odor, but nevertheless felt a certain exaltation of spirit on entering the new car. Perhaps she ascribed this feeling to the luxurious upholstery or to that intangible magic that attaches itself to celebrated makes of cars. Some of the famous movie temples have a faint whiff of light outdoor perfume to greet the incoming patron, to start that series of illusions that constitutes good entertainment.

Quite the opposite emotional reaction is obtained on walking into the living room of a house to find that it still reeks of stale tobacco smoke from last night's party, the odor returning to the air from the curtains, rugs and upholstery. The air seems "heavy" in rooms containing many people, as is particularly noticeable when we enter at some way station into a railroad car that has been long occupied. In the home we may encounter a burst of unpleasant odor from sauerkraut when it is first put on to cook.

We are greatly surprised when we step from a smelly atmosphere, to which we have become insensitive, out into fresh outdoor air. For a few moments we are amazed by the strong odor sensations as the successive layers of air pollution are dissipated from nose and lungs. We are virtually smelling odors that are not there, as our lungs are aired out.

In ways indicated, odors in the air, or their absence, can be a powerful social asset or deterrent. Unless we are indifferent to esthetic values, we should not overlook odor control of the air, whether it consists of removal of an unfavorable odor, presentation of a pleasant odor, or maintenance of an existing odor. Only rarely need we be concerned with toxicity due to inhaled odors, for only infinitesimal quantities of substance are usually absorbed. The problem of odor control is essentially one of esthetics, but it is no less important on that account.

SOURCES OF ODORS

Air odors may be of many types, according to circumstances. Probably the most generally disagreeable odor is that of perspiration. The "heavy" animal odor that emanates from sweated garments may be noted at a distance of several feet from some people, even when they are not actively exercising. Their clothing takes up the odor and emits "tailor shop" atmosphere at all times. When garments are first received from the dry-cleaner, they may, if cleaned with petroleum solvents, carry enough of the kerosene-like odor to scent a room. Tobacco smoke, especially that from unflavored items such as cigars and most English brands of cigarettes, has great lasting power in a room and is unpleasant to the last. Many pipe mixtures and all of the popular American brands of cigarettes are rather highly flavored with a "casing," which includes volatile odorants, such as ionone, coumarin, and hydroxycitronellol; and their tobacco odor, while strong initially, is rendered less objectionable in the end because of the volatile sweet flavoring used, which, even on hangings, tends to neutralize the unpleasant characteristics.

There are many other sources of odor about the house, store, or restaurant, sometimes strong and unpleasant, in addition to those noted above. Commonest among these are toilets, bugs, mice, cats or dogs; fireplaces or stoves; garbage and cooking; kerosene, fuel oil, or gasoline; laundry and even the leather of books. If one is alert to odors it is amazing how many will be noticed in a day.

CHEMICAL NATURE OF ODORS

Air odors include nearly all classes of chemical compounds. There are, for instance, acidic odors such as those of vinegar, sulfurous acid, and the fouler smell of butyric acid; the acid anhydride or lactone odors such as diacetyl which is the most distinctive component of butter flavor, and coumarin, which has a fragrance like that of new-mown hay; and the phenolic odors of tar, creosote and oil of cloves. On the opposite end of the chemical scale, there are the basic odors characteristic of fish, cantaloupes, feces and the quinoline of tars. In between are vast numbers of chemically neutral odors such as the esters of fruits, alcohols, aldehydes, etc. Some of the strongest odors known are those containing the

mercaptan class of sulfur compounds, as do the odors of skunk, roasting coffee, and certain petroleum refining operations.

DEODORIZATION

When the chemical nature of a particular odor is known, there is a fair chance of finding a neutralizing substance to eliminate it. If it is not known, however, the chance of finding a neutralizer is rather remote. Frequently the substance intended as a neutralizer will be either quite indifferent, or it may even accentuate the odor. Since odors are seldom accurately known and often are of mixed nature, there is statistically no opportunity for chemical neutralization by acids or alkalies. Furthermore, many odors are not destroyed by gaseous oxidizing agents such as chlorine or ozone, which have powerful and irritating odors of their own, so that "cold combustion" by the agents is out of the question. Whatever is to be used must capture and remove all odors, regardless of their chemical nature, if it is to be successful.

Odors associated with solid particles, as is largely the case with tobacco smoke, are amenable to removal by filtration or by electrostatic precipitation. Most of these odors are held by the "adhesive" on the filters of air conditioning units. However, the accumulated dust may evolve quite an odor, especially if the filter is installed in a moist place where musty-smelling fungi may thrive on it.

A more general method of odor removal is by "scrubbing" or washing the air. This is usually done by passing the air through successive layers of a spray of water, with or without added reagent. The very fine subdivision of the liquid favors intimate contact between it and every part of the air, and the successive extractions generally remove a large part of the odor, even though its solubility in water may be slight. An approximation of this air-washing technique takes place in every steamy room: the steam condenses into tiny droplets which scrub the air as they slowly settle out, and the layer of water vapor that condenses on walls and windows has appreciable scrubbing action.

There is much adsorption of odor onto solid substances if the air is brought intimately enough into contact with them. In practice, the adsorbent has to be in granular form in a rather thick layer through which the air is forced by a blower. Even if odor removal is not sufficiently complete in a single passage, air circulated by a blower will come back again for another treatment in say 10, 20 or 30 minutes. This operation takes a considerable amount of power and is generally feasible only for built-in air-conditioning installations or room-size portables. It is better for portable installations, however, than a washing device.

There may be some instances where silica gel or alumina will work better, but the best general odor adsorbent is activated carbon, especially that made from cocoanut shells. In practice, the carbon is used to a point far short of saturation, when it is replaced or is re-activated with steam by the supplier. Now in service in war plants are air deodorizing installations using canister type adsorbers through which the air passes following filtration. These installations permit reuse of air which has already been properly heated or cooked, instead of fresh air, and are claimed to operate with good overall economy.

GADGETS

Air scrubbing is possible with solutions freshly prepared from solid ingredients, such as sodium carbonate, potassium permanganate and persulfate. These alkaline and oxidizing substances are dissolved in water and may be sprayed into the air with a hand operated spray gun or other form of atomizer. When so used, they do a very creditable job, removing acidic and water-soluble odors quite well. When the droplets land, however, they do so as a dust of alkaline solid matter, to which some people object.

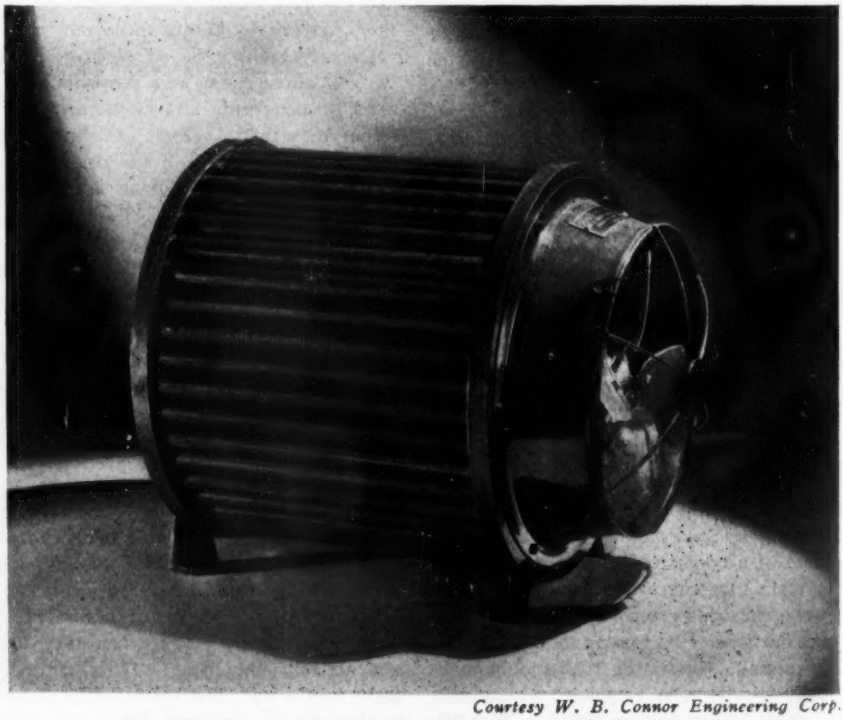
An alternative method of use, sometimes advised, is to put a saucepan of the solution in a warm place. This is of practically no effect, for air and liquid are not brought into intimate contact.

When odors are objectionable but not too strong, they may be masked by perfume. Perfuming or so-called re-odorizing of air makes the original odor more tolerable. A small quantity of an appropriate perfume is finely distributed throughout the air to "neutralize" the smell, which means to render the original odor unobjectionable. The odor of the perfume should not be conspicuous—usually it is something light and sweet but not easily recognizable. After it is smelled for a few moments, it is no longer noticeable.

The dispensing agent for the perfume may be a spray-gun, often used by theatre ushers to "freshen" the air of a theatre between shows. Sometimes a spray gun application of perfume to a dust-laden filter will make the partially conditioned air more acceptable.

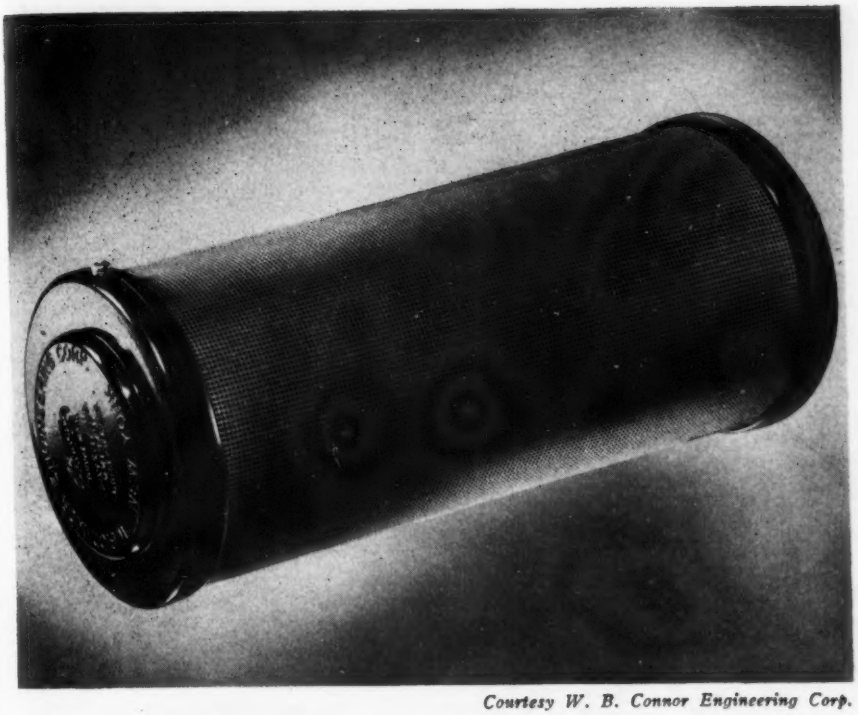
The dispenser may also be a bottle provided with a wick, generally used with water emulsions of perfume. For a time, after the wick is first pulled up, there will be good volatilization of the perfume from its watery emulsion. That short burst of odor may be all that is needed to make the original odor tolerable until we become accustomed to it. Gradually, however, the emulsifier coats the wick and finally stops the emission of perfume. For that reason, dispensers of aqueous perfume emulsions from a wick are not suitable for continuous odor emission, as may be desired in a store, for example, to greet successive waves of customers all day. For this service, either an occasional puff of spray or the evaporation of a straight perfume from a wick is a better provision. The success of any dispenser of perfume will depend upon the quality of the perfume volatilized rather than upon any mysterious ingredients that may be present in the liquid.

Authorities differ as to the function of formaldehyde as an ingredient of spray compositions. It certainly keeps the liquid spray itself from getting moldy. It has deodorant value for some kinds of odors, and possibly may, by its antiseptic



Courtesy W. B. Connor Engineering Corp.

Air with a low concentration of odoriferous materials is effectively deodorized by repeated forced passage through activated carbon.



Courtesy W. B. Connor Engineering Corp.

Odors in heavy concentration, as in chemical plants, are removed in one pass through canisters like this containing activated carbon.

action, stop local fermentations and spoilages in damp places. An interesting property of formaldehyde is that it, like ozone, tends to dull our noses to the detection of all odors. Since many people are allergic to formaldehyde, its general use is probably not to be recommended.

MARKET FOR CHEMICALS

For air-conditioning installations, there are relatively few chemicals to be sold for odor improvement of the air; for scrubbing, almost none; and for odor-absorption, perhaps only the first installation of activated carbon. It is not fundamentally a chemical-consuming business. There is fair-sized market, however, for perfume materials and formaldehyde for the making of odorants, whether these are to be used in spray-guns or in evaporators.

WAR USES OF LITHIUM

THE light metals aluminum and magnesium have received much publicity in their various war roles, but for security reasons little has been said about the lightest metal of all—lithium—although production of lithium minerals and concentrates has increased from about 2,000 tons in 1929 to 14,000 tons in 1944. Only last month did the War and Navy Departments permit release of some of the information on war uses of lithium.

To refresh the memory, lithium is a soft, silvery metal, about half as heavy as water. It is the lightest known solid, a cubic foot weighing 33 lbs. The same volume of magnesum weighs 108 lbs., aluminum 176 lbs., iron 490 lbs and lead 701 lbs.

OCCURRENCE

Like sodium, which it resembles, lithium never occurs in the free state in nature, although minerals containing it are distributed throughout the world in the earth's crust. Lithium occurs more abundantly than tin, lead, or zinc.

Principal commercially workable American lithium mineral deposits are in South Dakota and North Carolina. Spodumene, an ore containing lithium, aluminum, silicon and oxygen, is mined in these localities and lithium metal is obtained from it by a series of physical, chemical and electrolytic processes. The lithium content of the workable spodumene deposits varies from 1.4 to 3.3 per cent. Spodumene yields most of the commercial lithium products.

Lepidolite, an ore containing lithium, potassium, aluminum, fluorine, silicon, oxygen and hydrogen, is another source of lithium, as is the brine of Searles Lake, California (CHEM. IND. March 1945, p. 405). The latter is a potentially greater source than before the war.

Lithium costs $12.50 a lb. on government orders and commercially in quantities of 10,000 lbs. and up. In smaller commercial quantities it still sells in its prewar price range of $15 to $20 per lb. According to manufacturers, there are prospects that postwar production will be large enough to justify price reduction to as low as $5 a lb.

Lithium, as metal, alloy or in its various compounds, is performing the following jobs in war industry:

Removes gases and impurities in copper, tin and silicon bronzes.

Removes final traces of nitrogen from other gases, such as helium and argon.

Is an essential compound in fluxes for welding aluminum in airplane construction and for making magnesium castings for airplane parts.

Makes possible the use of lighter weight storage batteries.

In the form of lithium soaps, enables lubricants to flow freely at extremely high and extremely low temperatures.

In air-sea rescues, lithium hydride is used to generate hydrogen for inflation of the aerial balloon which permits operation of the portable Gibson Girl radio sending set.

POSTWAR USES

In addition to the above, lithium has been mentioned for a number of possible postwar uses.

Development of new metal products having special properties is expected to expand the use of lithium alloys. Lithium hardens and toughens lead, at the same time increasing its strength.

Lithium improves certain physical properties of copper castings, particularly electrical conductivity.

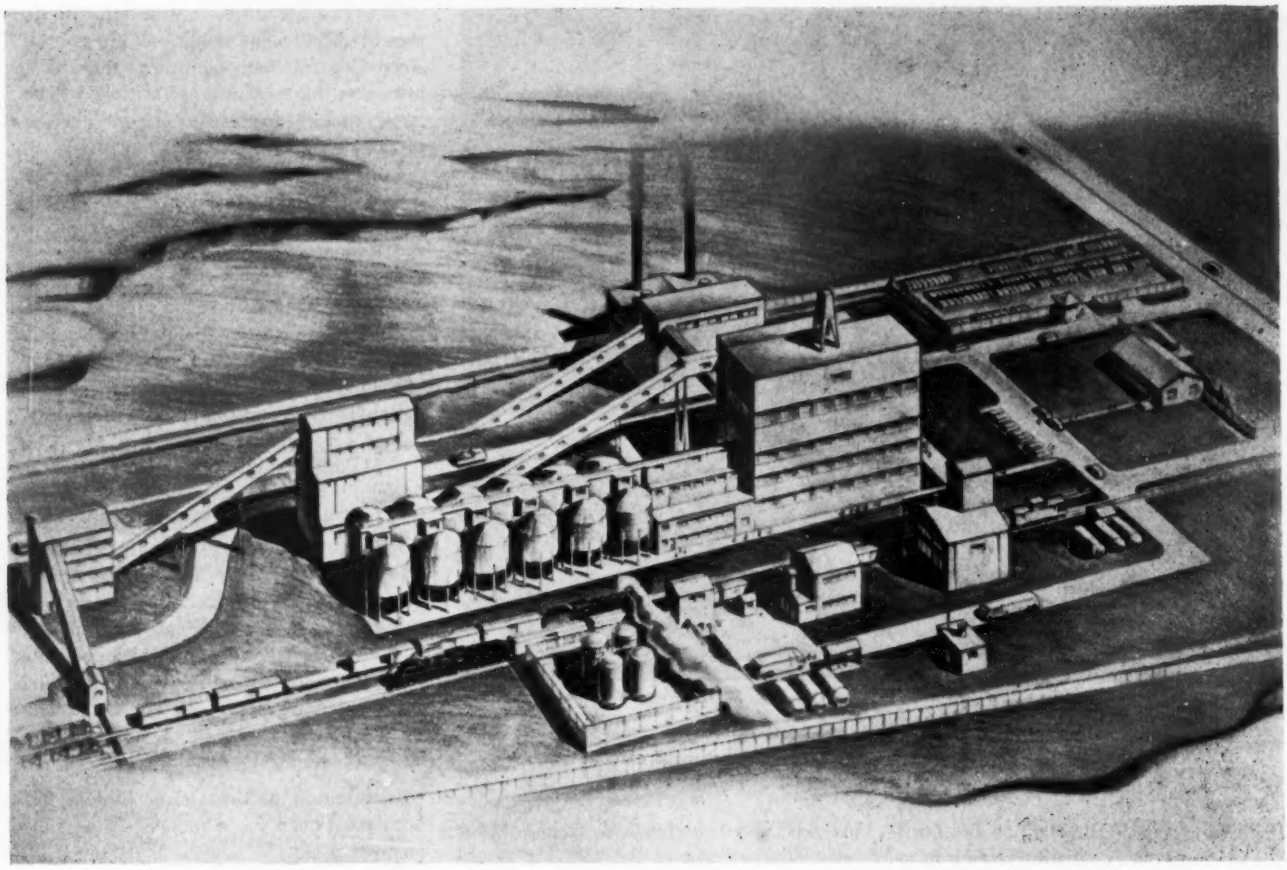
Lithium is a convenient grain refiner for many metals and alloys such as lead, zinc, aluminum and certain copper alloys. According to Dr. Hans Osborg of the Lithaloys Corp., important developments are nearing conclusion concerning the industrial application of lithium in cast iron, carbon steels and stainless steels.

The standard Edison storage battery depends on lithium salts to stabilize the amperage.

One of the most promising uses for ltihium salts is in air conditioning to control moisture content of the air.

Successful application of lithium compounds to lubricants and greases developed during the war suggests their use in industrial soaps to improve detergency and cleansing power under adverse conditions of temperature and pressure.

Additional use of lithium compounds in glass making is likely. Lithium carbonate is now used to increase strength and weather resistance of some types of glass. In other ceramics, lithium compounds are used to prevent "crazing," the surface cracking which sometimes occurs during cooling. Lithium compounds also are used to increase the fluidity of molten glass and to lower its melting temperature.



The Willamette Valley Wood Chemical Company plant near Eugene, Oregon, will produce over 10,000 gallons of alcohol per day from wood waste. It is scheduled to start operations this summer.

Chemical Economics of Wood Hydrolysis

by EDUARD FARBER
Timber Engineering Company, Washington, D. C.

THE ECONOMIC POTENTIALITIES OF ALCOHOL FROM WOOD are of timely importance in view of the scheduled opening this summer of the Willamette Valley plant. Costing over two million dollars, this plant will provide a commercial-scale demonstration of the modified Scholler process. This significant development is evaluated here with respect to operational costs for comparison with established alcohol processes.

A GREAT amount of scientific and industrial engineering work has been done in the field of wood hydrolysis. Those who are the most closely connected with this work will be the least inclined to think that all the problems have been solved and all the questions answered. The process of converting the carbohydrates of wood into soluble sugars and separating them from the insoluble lignin seems simple in comparison to many other processes used in the chemical industries. Nevertheless, the chemical reactions involved depend on so many varying factors that the many thousands of investigations carried out up to now have not exhausted the possibilities. As usual, progress consisted in opening our eyes to more problems than we could see before this progress was achieved. We can extrapolate from this experience and foresee that we cannot hope to have a theoretically complete knowledge of the processes at any time. Thus it is necessary to determine at which stage the results of research are sufficient as a basis for technical operation on an industrial scale. It is the task of chemical economics to determine this point and to show the economic result of an industrial operation which uses these chemical reactions in appropriate large-scale equipment. Four factors can be readily distinguished in the chemical economics of this as of any other process: raw materials, equipment, labor, and products.

RAW MATERIALS

The basic raw material is wood in the form of wood waste—a form in which it cannot be used for either lumber or fiber manufacturing. For lumber we need large pieces of solid, well-grown wood, for the production of fiber we need wood in the form of chips in which most of the cellulose fiber structure is intact and can be separated from lignin. In wood waste it is mainly the substance and only to a secondary extent the shape of the wood that is of importance, because here we destroy the structure of the carbohydrate part of the wood by dissolving it. The fundamental difference between the manufacture of cellulose and the process of wood hydrolysis is that in the first, the lignin is dissolved, and in the other, the cellulose. (See Figure 1.) The hemicelluloses in the former are in part dis-

solved with the lignin and in part left in the cellulose. In wood hydrolysis the hemi-celluloses are among the first to be brought into soluble form so that they are recovered with the rest of the carbohydrates. In both processes there is some destruction of wood substance, at the present time much more in the second than in the first method.

We need acid to carry out the hydrolysis, but not every acid will work satisfactorily. It would be no exaggeration to say that what we need is the acidity created by the presence of the acid and not so much the acid itself. This may sound somewhat metaphysical but it has a very definite economic meaning. If we use sulphuric acid[1], we do not utilize the sulphate ion in the hydrolyzing solution. Its advantage lies in the fact that the sulphate ion is easily converted into insoluble gypsum, which can be filtered out of the sugar solution after the acidity has served the purpose. It has been proposed to use sulphurous acid instead, which creates a comparable acidity at the high pressure under which the process is carried on and is much less soluble at ordinary pressure, so that it could be recovered by volatilization from the sugar solution.

To neutralize the sulphuric acid we need calcium carbonate, transformed into lime. These two raw materials, sulphuric acid and lime, are inexpensive. However, compared to the cost of wood waste, even the 5 percent sulphuric acid and the corresponding amount of lime are a considerable part of the total raw-material cost. For instance, with a plant using 200 tons of dry wood substance per day at a price of $2 per ton, the $250 expenditure for these additional raw materials represents about 60 percent of the price paid for the wood.

Another important raw material is water. In a plant converting 200 tons of dry wood substance per day by subjecting it to the action of 10 tons of sulphuric acid, which is neutralized by about 6 tons of burnt lime, it is estimated that over 2 million gallons of water are needed. Although water is cheap, its cost represents a considerable part of the raw-material cost. For instance, for one ton of wood at $2 in the plant, fifty cents worth of water is necessary.

But aside from byproducts, the emphasis lies on the wood as a source of carbohydrates. Let us compare it to other sources of carbohydrate materials—wheat, for instance. Equal weights of wood and wheat give about equal quantities of solubilized carbohydrate, with a small advantage for the wheat. Taking wheat at a very much lower figure than the present price and putting it for comparison's sake at $1 a bushel, it would require —without taking any other factors into consideration—$33 worth of wheat to furnish as much carbohydrate as $2 worth of wood. This has to be corrected for the much higher yield in alcohol, due to the greater fermentability of the wheat carbohydrates. If one gallon of alcohol is priced at fifty cents, of the 560 pounds of alcohol obtained from a ton of wheat, about 440 pounds represent the cost of the wheat, whereas of the 370 pounds of alcohol from one ton of wood, only 26 pounds have to be used to pay for the wood. From a ton of wheat we obtain 540 pounds of nonfermented materials in addition to the alcohol; from a ton of wood an approximately equal quantity, or around 600 pounds, of nonfermented lignin. (See Figure 2.) At the present time the value of the former is much greater than that of the lignin.

EQUIPMENT

Wheat contains carbohydrates in the form of starch which can be hydrolyzed by very dilute acids and by readily available enzymes to form solutions high in fermentable carbohydrates. Wood has to be treated in relatively stronger acids and in much more costly equipment that will withstand the high temperatures and pressures which are necessary. The carbohydrates of wood are obtained at about one-third or less of the concentration of those obtained from wheat. Neutralization of the solution and special methods of filtration to remove the calcium sulphate are necessary. Fermentation needs larger tanks because of the higher dilution, and not all of the carbohydrates present are transformed into alcohol. Since equipment has to be depreciated, it enters into the cost of the final product as if it were a gradually consumed additional raw material.

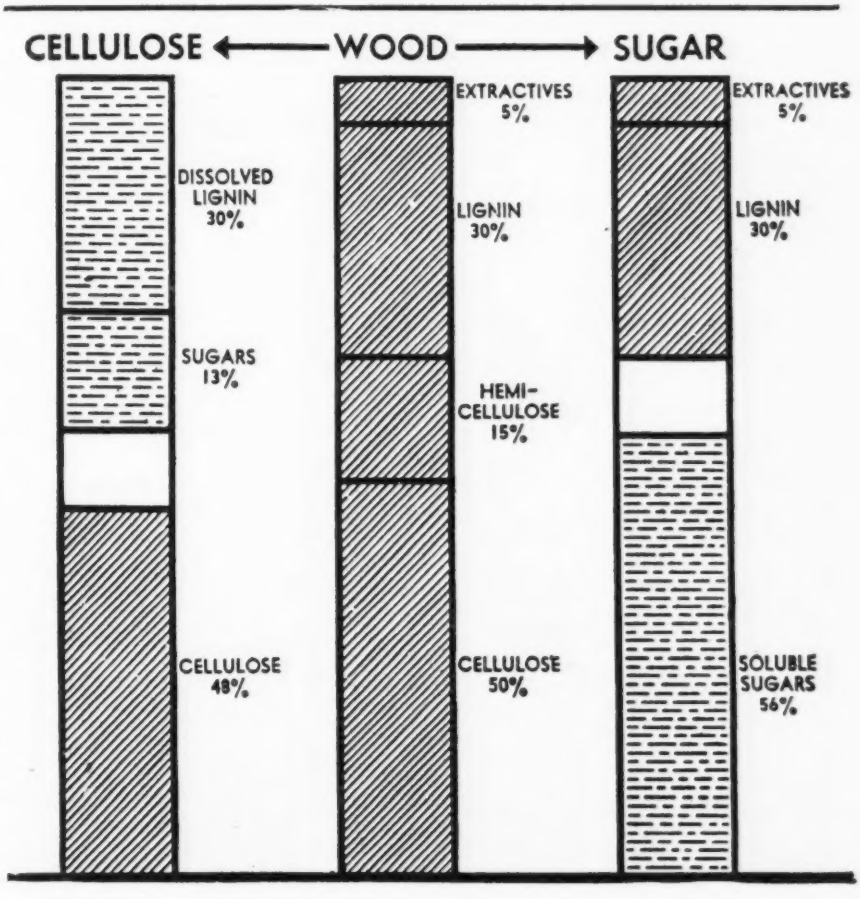
Without going into details of the necessary pieces of apparatus, we can indicate the influence of equipment cost on the cost of final products. In order to do that we have to set a somewhat arbitrary rate of depreciation. We can accurately determine amounts and values of raw materials and products, but it is not possible to figure accurately the continued value of equipment. One of the strongest factors that may enter into such calculation is the change in the method of processing which requires change in equipment.

Let us assume that 16 percent of the equipment cost is used up annually in depreciation and interest on the capital. Then for an annual production of 4,000,000 gallons of alcohol, each $100,000 of equipment cost would add four-tenths of a cent to the cost of one gallon. At present, the equipment cost for such a plant would be close to $2,000,000 and the burden on one gallon of alcohol would therefore be about eight cents. In this respect the manufacture of alcohol from wheat or other grains shows an advantage, since in a plant of about equal production the equipment cost would add only around three cents per gallon to the cost.

LABOR

In the boiler house and repair shop men are needed to keep the plant supplied. The actual work in the plant consists in

Figure 1



watching and turning some handles, but especially in being ready to draw the correct conclusions from observing gauges and colors. In a wood-hydrolysis plant of the size considered here, 60 men may be necessary to produce 4,000,000 gallons of alcohol at a cost of $200,000 in round figures, including supervision and overhead. This adds five cents to the cost of each gallon of alcohol. Again, this is more than the figure estimated for the production of alcohol from wheat, a result of the more complicated operation to produce the wood-sugar solutions.

PRODUCTS

At present the need is to produce alcohol[2]. Therefore these considerations are based mainly on alcohol as the sole product, disregarding the possibilities of other alternative and additional products, as for instance furfural, methanol, and yeast—the latter of which could be either additional or alternative to the alcohol. The recovery of distiller's grain and dried solids from the wheat slops reduces the cost of the wheat by ten percent, on an average, considering the cost of such recovery. With wheat at $1 a bushel, as previously assumed, the approximately 19 pounds of recovered byproducts would bring a net profit of about 10 cents and reduce the cost of the wheat in one gallon of alcohol from approximately 39 cents to about 35 cents. For wood at $2 a dry ton from which 55 gallons are produced, one gallon would have to be burdened with 3.64 cents as wood cost. Approximately 10 pounds of lignin are obtained for one gallon of alcohol; at a net price of about 0.4 cents the lignin would balance off the cost of the wood.

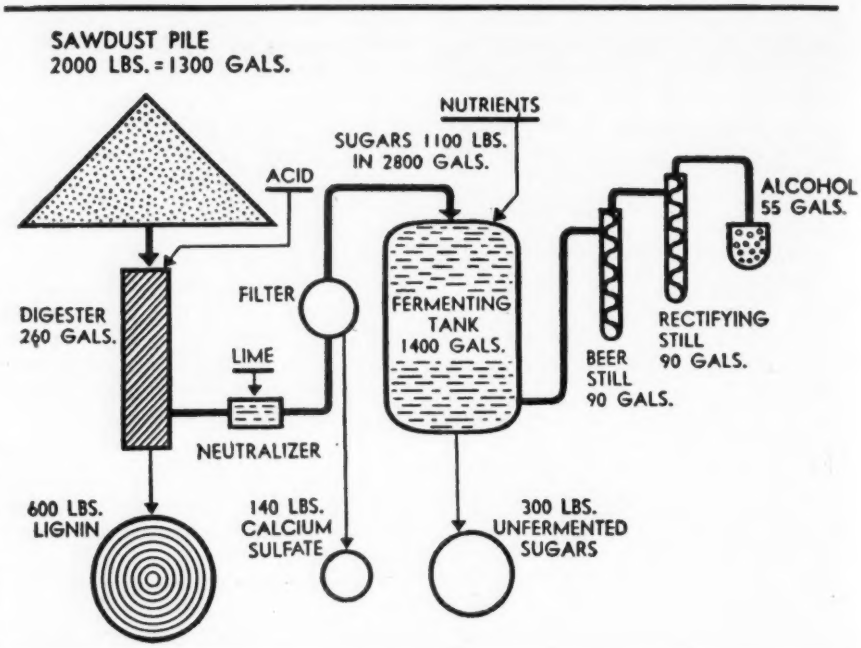


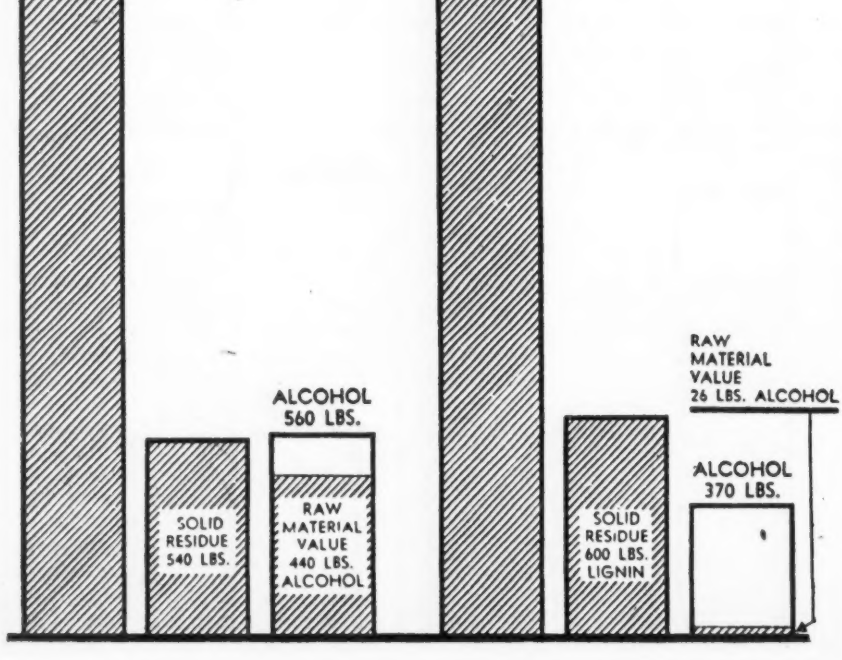
Figure 3

The total cost of alcohol from wheat is composed of the following factors: 35 cents for wheat, 2 cents for water and power, and 3 cents for equipment and 2.5 cents for labor, a total of 42.5 cents. For alcohol from wood sugar the corresponding figures are: 3.64 cents for the wood, 4 cents for chemicals used, 8 cents for equipment (based on a $2,000,000 plant), and 5 cents for labor, a total of 20.64 cents.

These figures are not offered as being absolutely definite in themselves but rather as a basis for comparison. It is clear that there are substances in wheat which can be utilized at a much higher level than that of alcohol production. But it is also possible that there are substances in wood which will soon be utilized on a higher level than is at present considered. The unfermented parts of the carbohydrates, amounting to about 15 per cent for wheat and 25 per cent for sugar from wood, remain in the slops. The wheat slops are utilized in stock feeds; while the wood-sugar waste can be utilized in the same field only after an additional operation consisting, for instance, in transforming these carbohydrates into yeast. By doing that, the products from one ton of dry wood substance would be increased by about 50 pounds of very valuable protein feedstuff which, at 10 cents a pound would add $5 to the gross revenues from one ton of wood.

From a ton of wood waste we now produce 600 pounds of lignin and about 400 of alcohol, with an approximately equal weight of carbon dioxide. (See Figure 3.) We are justified in expecting that fundamental research will show us how to utilize the 15 per cent of unfermented sugars. In this, as in other fields, chemical economics will contribute greatly to commercial success.

Figure 2



[1] The annual United States production of sulphuric acid is approximately 10 million tons. If 33 wood hydrolysis plants with a capacity of 200 tons of wood per day were in operation, they would consume about one percent of this production, as each plant would require 3,000 tons yearly.

[2] L. Turcotte, "Alcohol . . . from Industrial Waste," Chemurgic papers. Series 3, 1944, No. 325.

Editor's Note: Mr. Farber presented this discussion at the meeting of the Washington State Farm Chemurgic Committee in Longview, Washington, November 28, 1944, and printed by permission of the National Farm Chemurgic Council.

Carbon Monoxide Hydrogenation by the SYNTHOL PROCESS

HYDROCARBONS synthesized via the reaction of carbon monoxide and hydrogen at present are the subject of much discussion. Further information concerning the "Synthol Process," a variation of this reaction producing a mixture of hydrocarbons and oxygenated material, has recently been made available by the M. W. Kellogg Company.

EXCESSIVE drafts on the petroleum reserves of this country by World War II, for which the United States has been producing over 70% of the total petroleum requirements, have only served to emphasize the fact that our petroleum supplies are an exhaustible resource, and that the day is coming ever nearer when our requirements for liquid hydrocarbon fuels must be obtained from other sources, such as natural gas, oil shale, asphalt sands, and coal.

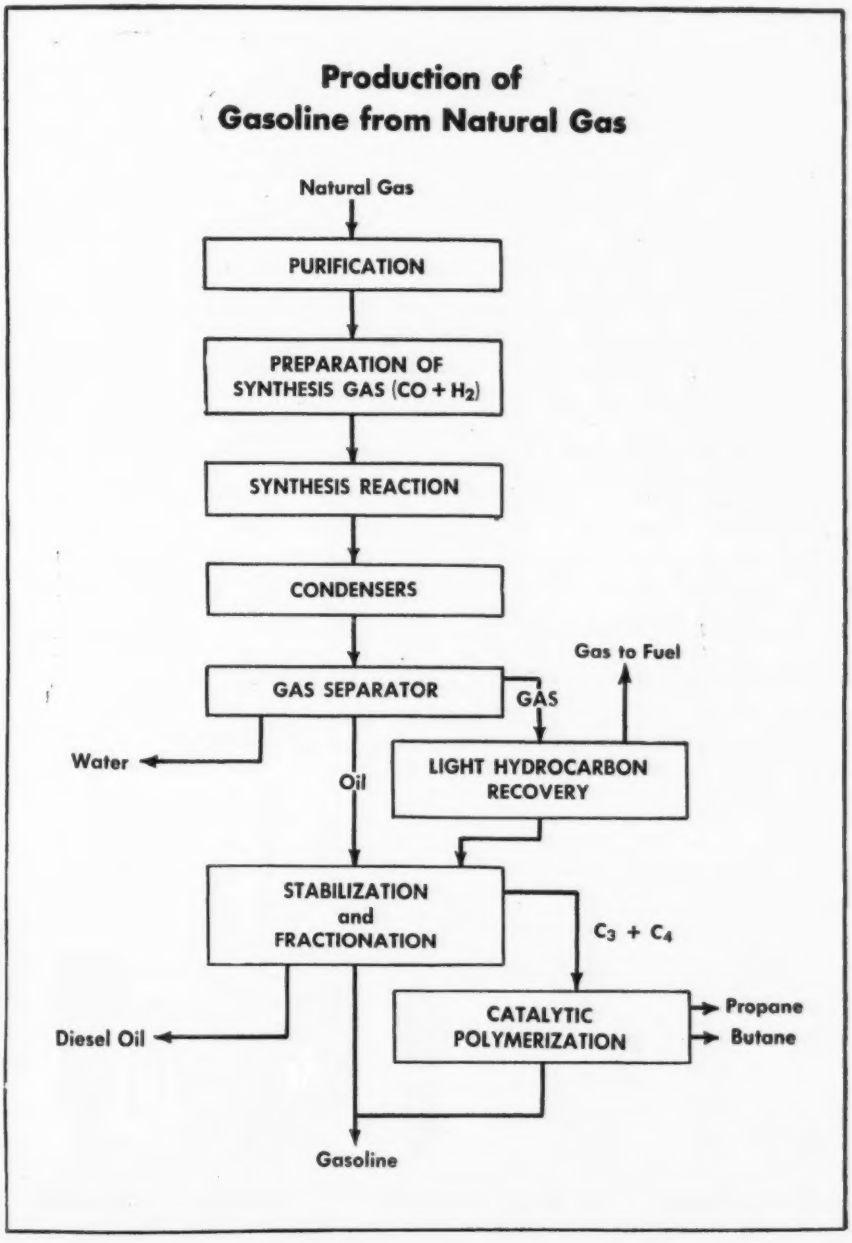
Stimulated by this necessity, the tempo of prewar research on the conversion of these various carbonaceous materials to liquid hydrocarbons has been greatly accelerated, both in government and private laboratories. The "Synbol Process" of the M. W. Kellogg Company for the preparation of liquid hydrocarbons from natural gas, wherein the natural gas hydrocarbons are first converted to a carbon monoxide-hydrogen mixture, is the result of some of this work. This carbon monoxide-hydrogen mixture is usually termed synthesis gas.

Amplifying an earlier statement that the process makes possible the production of motor gasoline 75 "clear" octane CFR-M, for approximately 5 cents per gallon, including 10% depreciation, from natural gas valued at 5 cents per thousand cubic feet, Paul Ryan, vice-president of the Kellogg Company, recently noted that, in addition to gasoline, the new process produces other liquid hydrocarbons such as Diesel oil (90-100 Diesel index) and butane. The yield of the various oxygenated organic materials, also formed, is dependent upon the conditions utilized for the reaction.

As can be seen from the accompanying flow chart this process consists of an initial purification of the natural gas, primarily for the removal of sulfur, followed by the conversion of the natural gas hydrocarbons to synthesis gas. The synthesis reaction which follows takes place in the presence of a catalyst, probably of the water-producing cobalt type, and very close control of the conditions must be maintained to allow conversion of the synthesis gas to the mixture of hydrocarbons, water and oxygenated materials. These products are liquefied and the resultant water and oil layers are separated—the water layer carrying most of the oxygenated material. The light gaseous products from which a C_3-C_4 fraction is later recovered are also removed at this point. The oil layer is then fractionated to obtain the liquid hydrocarbon products such as gasoline and Diesel oil; the liquid oxygenated materials being removed from the water layer and refined in another section of the plant.

Mr. Ryan also noted that "While the total volume of oxygenated compounds produced from any one plant constitutes a small percentage of the total pre-war, and estimated post-war, consumption of similar products by the chemical industry, the operation of many such plants might saturate the market . . ." When this statement is viewed in light of the relative volume of materials produced by the petroleum and chemical industries it would appear that the ratio of oxygenated product to hydrocarbon must be quite low.

Mr. Ryan further stated that Kellogg has conducted research on this process since 1935. Data on the Fischer-Tropsch Process was acquired in 1937 and by continuing this development, Kellogg has now arrived at the point where commercial plants are being designed.



Small Chemical Companies Can Afford a Research

by DR. WALDEMAR DIETZ, Technical Advisor, Gallowhur Chemical Company, New York, N. Y.

THE WELL-ESTABLISHED BENEFITS OF RESEARCH need not be enjoyed only by large companies. Small and medium-sized concerns can also afford a practical research program which will bolster their competitive position by the development and improvement of marketable products.

ONE of the fundamental lessons industry has learned—or relearned—from the war is that research pays. Large corporations, true enough, have been consistently spending large sums of money for research activities over many years, because experience has proved that it is profitable to do so. But it is amazing how many smaller concerns have been going along from year to year with no research whatever, no planning or building for the future of any kind—some of them with surprising success. Just how long researchless organizations will be able to yield a profit in the face of postwar competition, however, is very much a question, particularly in the chemical field.

It is not the purpose of these comments to reiterate the advantages of research, but rather to point out how this modern tool can serve the small business man or manufacturer.

The word research frequently brings to mind a picture of an elaborate laboratory in which are carried out involved, expensive technical investigations. Actually, research covers a broad range of activities. It may take any number of forms and can be carried out on any scale desired. In fact, one chemical company executive has defined it simply as "an organized search for a better way."

In the light of modern competition it can no longer be regarded as a luxury which the smaller business cannot afford. Indeed, research is an investment—and a mighty profitable one—which the small business cannot afford to do without.

The war has in itself created demands for improved matériel, and the stimulation of higher wages has created an increased market for the products of all types of business. Competition for these markets will, increasingly in the post war years, call for greater efficiency on the part of both personnel and product. In order to keep pace with the demands put upon it, industry will find it necessary to avail itself of every facility within its reach, and to bring together the best efforts of the academician and the realist, for it is in research alone that these divergent factors find a common level for harmonious and effective cooperation.

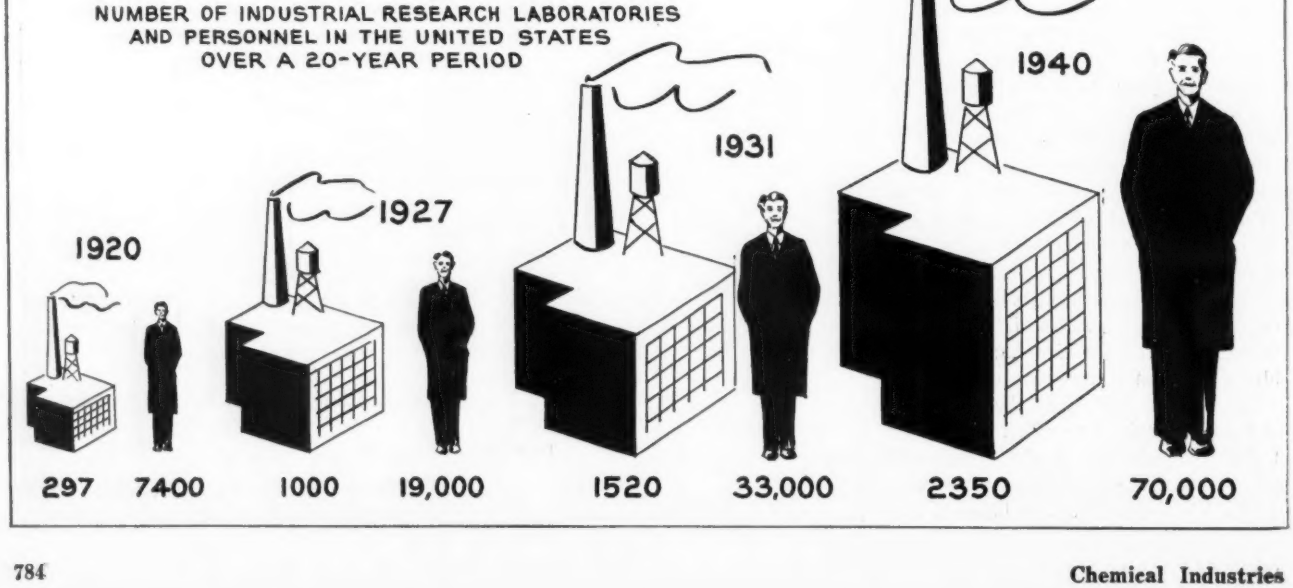
Able men with vision and experience have said many worthwhile things about research planning, but their remarks have been addressed chiefly to the larger concerns whose leaders already acknowledge the necessity of such activity. The smaller business man still hesitates to include research in his operating budget.

Money alone is not the prime requirement; rather it is careful analysis of needs, coupled with sound business judgment. A research program must be tailored to the particular needs of the business rather than directed to some far flung objective which might be unattainable within the financial limits of the sponsor.

Assuming that a research program is to be inaugurated, what yardsticks are available with which to measure immediate needs?

CAPABLE DIRECTION

First, a qualified directing head must be chosen. Successful administration of a research program does not require academic proficiency so much as mature and realistic judgment, coupled with the ability to evaluate academic requirement in personnel selection. The directing head should be thoroughly acquainted with company policy and should be in a position where freedom of thought and intellectual honesty can be freely exercised. Such a status might best be preserved if the directing head be on a consultant or retainer basis rather than on a directly employed basis. Moreover, diligent pursuit of the research activity might not



Program

require his full-time attention, for in the development of research activities, much of the detail work can often be carried out to better advantage at points away from the plant—in fellowship work at schools or colleges for example. In some cases, outside laboratories specializing in certain specific lines may be more suitable.

The experienced research director will know how to segment and coordinate the overall activity to produce the most results for every dollar expended, reflecting good managerial capacity in so doing.

Basically, research may be divided into two fields of endeavor: Fundamental research and applied research. In general, the smaller business will be concerned with the latter, because it is primarily involved in activities where the time factor and the limitation of funds necessarily delineate the scope of operation.

THE THREE P'S

Successful research programs must at their inception be resolved down to fundamentals of the three P's: policy, procedure, and personnel. Policy concerns itself with the over-all program; procedure must concern itself with the administrative know-how; personnel must concern itself with who does what.

In industry, particularly in many smaller plants, some effort has been made to establish a semblance of technical control. Such control work must not be confused with research; the two activities cannot be carried on successfully by the same personnel. Real research requires a high degree of concentrated effort which cannot be attained if the program is constantly interrupted. Once established, a research program must be free from interference by "management."

A most important point of a successful research program concerns the management of the activity. Too often the title of Research Director conferred upon the directing head is a poor morale factor, tending to subordinate the personnel actually doing the work. The designation Technical Advisor has its advantages: it implies more correctly the true function of the directing head, inasmuch as it is his responsibility to act as counsellor and coach to the rest of his staff.

Successful direction of research programs, unfortunately, is not something that can be gathered from books alone. Broad experience is needed, calling for administrative ability and—more important than anything else—a generous amount of good common sense. Results come through people, and proper direction of the personnel is, in the final analysis, the difference between success and failure of any research program.

BUDGET

Our government has long recognized the value of research, and the expense of such an activity is a deductible tax item. Why not take advantage of this? Helping business to help itself is a profitable policy and thoroughly consistent with our democratic ideals; and it works for small as well as large business.

It has been estimated that there are more than 17,000 manufacturing firms in the U. S. doing $500,000 or more business in annual gross sales of which less than 2,500 are reported to have research and development facilities. Those reporting to the National Resources Planning Board spend annually an average of 2% of their gross sales. Taking a typical research budget we find that in the case of a concern doing a million-dollar gross business, the breakdown of the budget is as follows:

Directing head	$9,000
Consultant services	2,000
Testing laboratory expense	4,500
Secretarial service	1,800
Traveling expenses	800
Subscriptions and books	200
Incidentals	300
Overhead charges	1,350
Total	$19,950

The total of $19,950 is in close agreement with the $20,000 a year which companies whose gross sales average $1,000,000 can safely spend. It should be borne in mind, in connection with the above comments on research direction, that a full-time director may not be required. Moreover, a capable director will not require highly trained personnel. The $9,000 item listed for direction might well be broken down to include salaries of technicians.

Some DONT'S to Observe When Setting Up a RESEARCH DEPARTMENT

DON'T try to conduct research without a qualified directing head; it doesn't pay.

DON'T select a research staff first and then call in a director and expect him to get results.

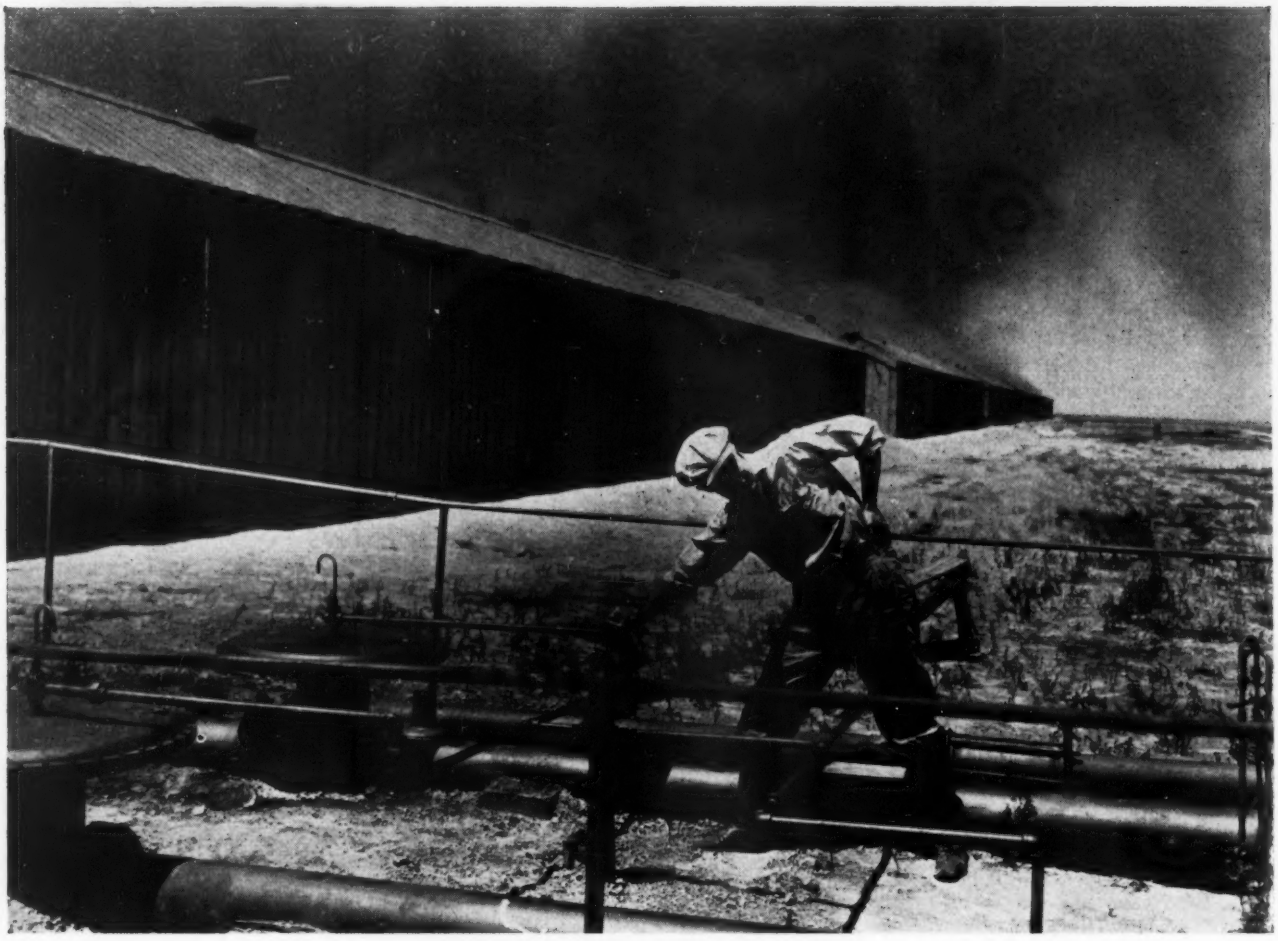
DON'T expect to use the research laboratory as a plant control lab. They are totally different functions, and it won't work.

DON'T use the research laboratory as a complaint department for the sales division. It is not supposed to be a "trouble shooter."

DON'T allow the sales, production, or purchasing departments to impose upon the research laboratory as an information bureau.

DON'T put the laboratory too near top management's offices. Put it near plant production if necessary, or better, segregate it from both of them.

DON'T allow research policy to be dominated by plant management. Remember that research is an investment. Give it a chance and it will pay dividends.



Natural gas lines entering a carbon black plant

The Changing Economics of Carbon Black Manufacture

by BENJAMIN MILLER
Institute of Gas Technology, Chicago, Ill.

THE RECENT SHORTAGE OF CARBON BLACK has focused new attention on the economics of manufacture of this important rubber compounding ingredient. Here the author discusses some of the factors influencing costs in this industry, with special emphasis on raw materials.

HUNDREDS of thousands of tons of carbon black are produced each year from hundreds of billions of cu. ft. of natural gas. The carbon black industry has been in existence for many years but it is still changing and will doubtless continue to change.

Several processes are in use for the manufacture of carbon black, but until recently the channel process accounted for all but a small fraction of the total production. One distinguishing feature of the channel process is the small yield. Less than 5% of the carbon in the gas is recovered as carbon black. This low yield has several effects. It makes it necessary to use large volumes of gas to produce channel-process carbon black at a commercial rate. Since the price at which the product sells is relatively low, that is, a few cents per lb. for the great bulk of it, only low-priced gas could be used. The money yield as well as the material yield being low, the use of natural gas as a raw material for channel-process carbon black came to be considered an inferior use. The carbon black industry had to move away from a locality as soon as the price at which natural gas could be sold there for fuel became greater than its value for carbon black manufacture. In some states the use of natural gas for carbon black manufacture was restricted by law.

Other processes were developed which produced a greater yield of carbon black per MCF (million cu. ft.) of gas, but the carbon black produced by these other processes was less desirable for the major carbon black market, that is, for use in rubber tires. The shift from natural rubber to synthetic rubber changed the picture. Carbon black made by other processes, notably by the furnace process, was found to be relatively more suitable for use in synthetic rubber tires than it had been for use in natural rubber tires. The spectacular growth of the synthetic rubber industry was accompanied by a less publicized but tremendous increase in the production capacity for furnace-type carbon black.

Furnace-type carbon black can be made in yields of 25% and higher rather than 5% or less. Thus, insofar as furnace black can serve purposes formerly exclusively served by channel black, the

carbon black industry takes on a new aspect. If five times as much product can be made per unit of gas consumed, the value of natural gas for carbon black production may increase considerably before it hits the ceiling imposed by the market value of the carbon black produced. Furthermore, the high material yield makes it very difficult to consider the production of furnace-type carbon black an economic waste. It may even be that the production of furnace-type carbon black will some day be looked upon as a superior use of natural gas.

Another important effect is that the amount of gas required for a commercial size plant is much less. A furnace-type carbon black plant using 5,000,000 cu. ft. of natural gas per day is large enough to be practical.

THERMAL DECOMPOSITION BLACK

Both furnace black and channel black are made by partial combustion of natural gas. Other methods for producing carbon black involve thermal decomposition of natural gas, carried on in such a way that no combustion products are mingled with the carbon black, though heat for the decomposition is generated by combustion. There are various modifications of this general process, and the products of the various modifications have properties differing from channel black and from furnace black, and among themselves. Uses for these thermal decomposition carbon blacks have also increased. The thermal decomposition process also produces hydrogen, and in some cases the hydrogen is considered the main product and the carbon black the by-product.

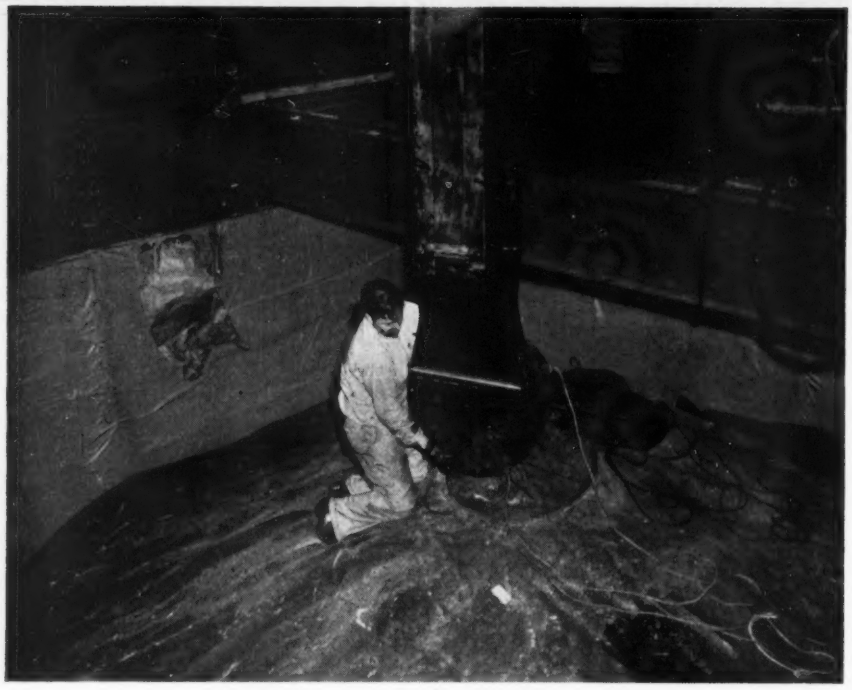
At least one such operation has been going on for many years, the hydrogen being considered the principal product and being used in the manufacture of synthetic ammonia. A plant using about 5,000,000 cu. ft. of gas per day and producing 100 tons of ammonia per day is definitely commercial. For such a plant the cost of the natural gas is secondary, since the value of the ammonia produced is so great compared to the value of the natural gas consumed. Low-cost natural gas is undoubtedly desirable but not necessary for such an operation, and if other reasons make it advisable, such a plant could be located at a considerable distance from the producing walls.

While the differences among the various carbon blacks are of great importance in connection with their several uses, it suffices to point out that the various types are not completely interchangeable, and therefore price differentials exist and can be maintained. However, research by the various consuming industries is stimulated by such price differentials because the consumer has an incentive to modify his process so as to be able to use the cheaper carbon blacks, which are those made in higher yields. Also, the producers of the lower-priced carbon black are stimulated by price differentials to do research looking toward more nearly perfect control of the properties of their products so as to make them suitable for more varied uses. It seems inevitable that as a result of these developments the average yield of carbon black from natural gas will increase. This will tend to make the cost of the gas itself a less important factor. Furthermore, if yield increases it becomes possible to think of making carbon black near the point of consumption rather than where the gas is cheapest. The cost of shipping carbon black from the points where cheap natural gas is available to the consuming centers may exceed the cost of the gas from which the carbon black is made, particularly in the case of high-yield processes. It would probably be feasible to make carbon black near the center of the consuming market if the yields were 30 pounds per MCF because the cost per MCF of moving natural gas by pipe line to a consuming center would probably be less than the cost of moving 30 pounds of carbon black.

BY-PRODUCTS

It is thus possible to discern two opposing tendencies. As yield is increased, the amount of gas required for commercial operation decreases so that more locations become possible sites for carbon black plants. On the other hand, as the yield increases there should be a tendency to move the gas to the consuming market and produce carbon black close to the market. There is also to be considered the matter of by-products or concurrent products. It was mentioned above that hydrogen is produced along with carbon black by some processes and the hydrogen may be used in ways to be discussed below. Now the amount of gas necessary for such a commercial operation may also be relatively small, of the order of 5,000,000 cu. ft. per day. However, utilization of the hydrogen may restrict the location of the plant since hydrogen is relatively costly to transport, but there may be locations where both carbon black and hydrogen can be utilized. The possibility exists of producing other by-products along with carbon black. This is more likely to come about if the higher hydrocarbons are used as raw material. It is

A channel black plant in operation. Long sheet iron houses enclose the traveling burners.



Suction nozzle about to enter canvas held liner at start of discharging black to storage.

quite possible to conceive of a process in which ethane-propane mixture from a natural gasoline plant will be partly converted into carbon black, the remainder being a gas having a reasonably high heating value so that it may be put in pipe lines for transportation to fuel markets.

Two further possibilities deserve consideration. Where furnace-type black is produced, the tail gas has so low a heating value that it cannot be economically placed into pipe lines for transportation to distant fuel markets, and generally there is very little use for it as a source of energy at the point of production. Near a consuming center, however, a large volume of low heating value gas may be valuable, so that it may become economically feasible to utilize the tail gas from a partial combusion carbon black process as a source of heat or of mechanical energy. Then consideration of economic waste could thus be eliminated. The possibility therefore exists that gas may be transported from a location at which its use for carbon black manufacture would be uneconomical to another location and there converted into carbon black, and the tail gas utilized so as to make the entire process efficient in material use as well as economic.

OTHER BLACKS

Natural gas is not the only possible source of hydrocarbons from which carbon black can be made. A form of carbon black known as acetylene black is made from acetylene in Canada, the acetylene being derived from calcium carbide made in electric furnaces from coke and limestone. In England and Germany, according to published reports, carbon black is made from naphthalene or other hydrocarbons derived from coal by carbonization. While it does not seem that electric furnace acetylene or coal carbonization by-products are likely sources for carbon black in this country, there is the possibility that carbon black will be made from hydrocarbons derived from petroleum. There have been published reports that carbon black has been made, on an experimental scale, at least, from liquid hydrocarbons derived from petroleum. The cost of liquid hydrocarbons available for carbon black manufacture has probably been too high to make such a process economical if consideration be given only to raw material. However, if yields of carbon black sufficiently high can be obtained from low-priced liquid hydrocarbons, the saving in transportation cost may make production of carbon black from liquid hydrocarbons at points near consuming markets an economic possibility. Furthermore, hydrocarbon gases derived from petroleum are available at oil refineries, some of which are near carbon black markets. Production of carbon black from refinery gases at such locations appears to be a possibility under some conditions.

It has already been mentioned that the shift from natural rubber to synthetic rubber has had considerable influence on the carbon black industry and has caused increased demands for carbon blacks other than channel black. This is not to say that channel black is not used with synthetic rubber; on the contrary, the demand for channel black has also increased, but not to so great an extent. When natural rubber is once more available in quantity, will channel black regain its predominant position or will the improved position of other types of carbon black be maintained? Any answer to this question must be based on some assumption as to the future relation between natural and synthetic rubber production. However, it seems fairly certain that manufacturers of other types of carbon black will succeed, at least to some extent, in modifying their products to make them usable with natural rubber to a greater extent than was the case in the past, and the rubber manufacturers will undoubtedly develop means of compounding natural rubber so as to take advantage of the desirable attributes of all types of carbon black.

While any prediction as to the relative importance of natural and synthetic rubber in the future would be extremely hazardous, it seems safe to say that the total consumption of rubber of all kinds will increase steadily in the immediate postwar period, so that the market for carbon black afforded by the rubber industry should be expected to increase. It is also quite likely that there will be expansion in the demands for carbon black for other purposes and that these will be stimulated by research and development work which the carbon black manufacturers will initiate to expand their markets.

Taking all of the foregoing into consideration, it would appear that greater production of carbon black is to be expected in the future, but that on the average, the number of pounds of carbon black obtained per MCF of natural gas will also increase, and other raw materials may be used, so that the total quantity of natural gas used for carbon black production may even decrease. Furthermore, the newer processes for carbon black production may make possible the use of gas which could not formerly have been considered for this purpose because the amount available was insufficient for commercial operation. Thus it is reasonable to expect that carbon black production will take less natural gas which might otherwise go into pipelines in the future than it has in the recent past.

One other point seems worthy of attention. In some places sour natural gas has been used for carbon black production though sweet natural gas could not be so used. At least one large producer of carbon black planned to treat sour gas for hydrogen sulfide removal before using the gas to make carbon black. While the plan seems to have been abandoned, the very fact that it could be seriously considered indicates that the cost of hydrogen sulfide removal has so greatly decreased that the distinction between sour gas and sweet gas with regard to their use as raw material for carbon black manufacture should be re-examined.

The above is a condensation of one section of a paper entitled "Chemical Utilization of Natural Gas," which was prepared by Mr. Miller as a report to the Technical and Research Committee of the Natural Gas Department of the American Gas Association.

ION EXCHANGE

An Old Process Finds New Uses

by SIDNEY SUSSMAN[1] and ALBERT B. MINDLER[2]
The Permutit Company, New York, N. Y.

THE NEWER SYNTHETIC ORGANIC ION EXCHANGERS are being used successfully and economically in many operations that were impossible with the earlier inorganic materials. Here, in condensed form, the authors present a current overall appraisal of the unit process of ion exchange, indicating what it can and cannot do in its present state of development

ION EXCHANGE has been studied from many viewpoints during the century since its discovery by H. S. Thompsor. in 1845, but only within the last forty years has the process been put to practical industrial use and then primarily in but one field—water softening. However, within the past ten years the development of new organic ion exchangers with properties far superior to the earlier natural and synthetic inorganic materials has made commercial use of the principles of ion exchange possible for such widely varying processes as the recovery of high quality pectin from grapefruit wastes and the preparation of acid-free formaldehyde solutions for resin manufacture.

Some semblance of order may be brought to the scores of seemingly unrelated industrial and laboratory applications of ion exchange reported in the literature by considering them in the light of five ion exchange reactions and a limited number of type processes which include:

A. Removal of undesirable ionic impurities from solutions.
B. Addition of specific ions to solutions.
C. Recovery of valuable substances from solutions.
D. Separation or fractionation of electrolytes.
E. Use as solid contact agents.
F. Miscellaneous processes.

TYPE REACTIONS

Ion exchange is defined as the reversible interchange of ions between a liquid phase and a solid, involving no radical change in the structure of the solid. Depending upon the ionic charge of

[1] Chief Research Chemist.
[2] Research Chemical Engineer.

WHAT IS ION EXCHANGE?

KNOWN FOR a hundred years, ion exchange as a unit chemical process is defined simply as a reversible interchange of ions between a liquid and a solid involving no radical change in structure of the solid. In water softening, for example, which has been the principal application of ion exchange in the past, water is passed over a cation exchanger such as sodium zeolite, and the Mg and Ca ions from the water change places with the sodium ions of the zeolite, thus removing the hardness from the water.

The recent development of improved ion exchangers has made the process the subject of increasingly widespread interest outside the field of water treatment. It is now used in such diversified operations as preparation of a high quality pectin from grapefruit rinds, purification of formaldehyde, and the recovery of copper from cuprammonium rayon waste liquors.

While it has definite operating and economic limitations, as mentioned in the accompanying article, ion exchange is expanding steadily in scope and utility and it will undoubtedly be of increasing value to chemical industry.—Editors.

the exchanging ions, the process may be cation exchange (previously called base exchange) or anion exchange.

The fundamental ion exchange reactions are few and simple. Cation exchange may be carried out according to the *salt cycle* in which one metallic or organic cation is replaced by another:

$$Ca^{++} + Na_2Z \underset{\text{regeneration}}{\overset{\text{reaction}^*}{\rightleftharpoons}} 2\,Na^{+} + CaZ \quad (1),$$

* Z = Cation exchanger.

or according to the *hydrogen cycle* in which all metallic or organic cations in solution are replaced by hydrogen ions provided by an acid-regenerated cation exchanger:

$$2\,Na^{+} + H_2Z \underset{\text{regeneration}}{\overset{\text{reaction}}{\rightleftharpoons}} 2\,H^{+} + Na_2Z \quad (2).$$

Anion exchangers may be used to carry out true anion exchange reactions of the type:

$$SO_4^{--} + 2\,(R_3NH)\,Cl \underset{\text{regeneration}}{\overset{\text{reaction}^*}{\rightleftharpoons}} 2\,Cl^{-} + (R_3NH)_2\,SO_4 \quad (3),$$

* R_3N = Free anion exchanger.

or to effect acid removal:

$$HCl + (R_3N) \longrightarrow (R_3NH)\,Cl \quad (4)$$

in which case the anion exchanger is regenerated by treatment with a solution of an alkali:

$$2\,(R_3NH)\,Cl + Na_2CO_3 \longrightarrow 2\,R_3N + 2\,NaCl + CO_2 + H_2O \quad (5)$$

It is possible that acid removal actually is a true anion exchange reaction in which the anion in solution exchanges for a hydroxyl ion of the anion exchanger base, following which the liberated hydroxyl ion combines with the hydrogen ion of the acid to form water. Conclusive proof of either mechanism has not yet been demonstrated.

Quite obviously, a combination of hydrogen cycle cation exchange and acid removal, in that order, will result in the complete removal of all electrolytes from a solution. This process is commonly called demineralizing.

TYPE PROCESSES

Removal of Impurities. Removal of undesirable ionic impurities from solutions is the most common process in which ion exchange is employed. The well-known zeolite water softening process is a typical example. Calcium and magnesium ions, which cause much economic waste in the form of excessive soap consumption and the deleterious effects of scale formation, are removed from water supplies by passing the water through a cation exchanger bed which exchanges these ions for sodium ions. Numerous variations of this process have been described including hydrogen cycle, mixed sodium-and-hydrogen cycle, and mixed lime-soda and zeolite operation.[61] Each of these may be used to good advantage depending upon the raw water quality and the desired treated water composition.

The earliest suggested industrial ion exchange application is the direct opposite of this most common application. In 1896 Harm[23] suggested that the yield and quality of beet sugar could be improved by replacing the molasses-forming sodium and potassium ions with calcium ions by contacting the sugar solution with a natural zeolite (siliceous cation exchanger) which had been regenerated with a calcium salt. The process was carried out in a number of beet sugar factories but never achieved general acceptance because the sodium and potassium present in the juice did not efficiently displace the calcium from the cation exchanger. Furthermore, the calcium which was added to the juice caused increased scaling of evaporator surfaces and other difficulties which outweighed the beneficial effects of the treatment. More modern processes, described below, have been applied to the same problem.

Many other instances may be cited in which cation exchange is used to replace undesirable cations by other cations which do not have an adverse effect in the particular application. Reduction of the calcium content of milk by ion exchange[33] yields an edible product of improved digestibility for infants. This process has been applied commercially. Many other ion-exchange modified milk products have been described in the patent literature by members of the staff of M & R Dietetic Laboratories.

Another successful ion exchange process in the food industries is operated by Universal Colloid Corporation for the preparation of a high quality pectin from grapefruit hulls by use of an acid-regenerated cation exchanger to remove metallic cation impurities.[41] In this process the hydrogen cation exchanger (Zeo-Karb H) is added to the water and *albedo* (the rind and the rag of the grapefruit) and is later removed by centrifuging. While less common than passage of the solution through a fixed bed of the ion exchanger, this procedure is also practical and in some cases is the preferred method.

Substantially non-aqueous media may also be treated by ion exchange. Jones[30] has patented a process for the treatment of crude petroleum by a sodium cation exchanger. The resultant conversion of calcium and magnesium chlorides to sodium chloride is said to reduce corrosion of refinery equipment because of the smaller tendency of the latter chloride to hydrolyze. A cation exchange method for the removal of copper from gasoline has also been patented.[54]

There are numerous other processes employing cation exchange for the removal of undesirable cations from solutions. In water treatment, the usual cation exchangers or manganese zeolite (acting as a granular oxidant) are employed in many plants for the removal of iron and manganese.[4] In a less common application, an acid-regenerated organic cation exchanger is used as the absorbent for ammonia in industrial gas masks.[62] Bahrdt[7] applied ion exchange for the removal of interfering metals in an analytical determination for sulfates.

The removal of fluorides from drinking water supplies by hydroxyapatite[2] is a typical case of removal of an undesirable anion which has been in large scale use for some years. Some observers classify this as *anion* exchange. In another anion exchange process the chloride ion is removed from glutamic acid hydrochloride by contact with an anion exchanger.[11]

Anion exchangers are in use commercially for the removal of formic acid from formaldehyde.[39] Acid removal from other industrial products, such as dextrose solution[13] and pectin[48] also has been effected by anion exchangers. The same process was applied in a laboratory investigation on the enzymatic synthesis of sucrose,[24] and Maizel[35] patented its use for removing acidic taste-forming materials from a vitamin B extract. Poth and Elliott[49] have used the natural cation exchanging zeolites as inexpensive laboratory media for scrubbing acids from exhaust gases.

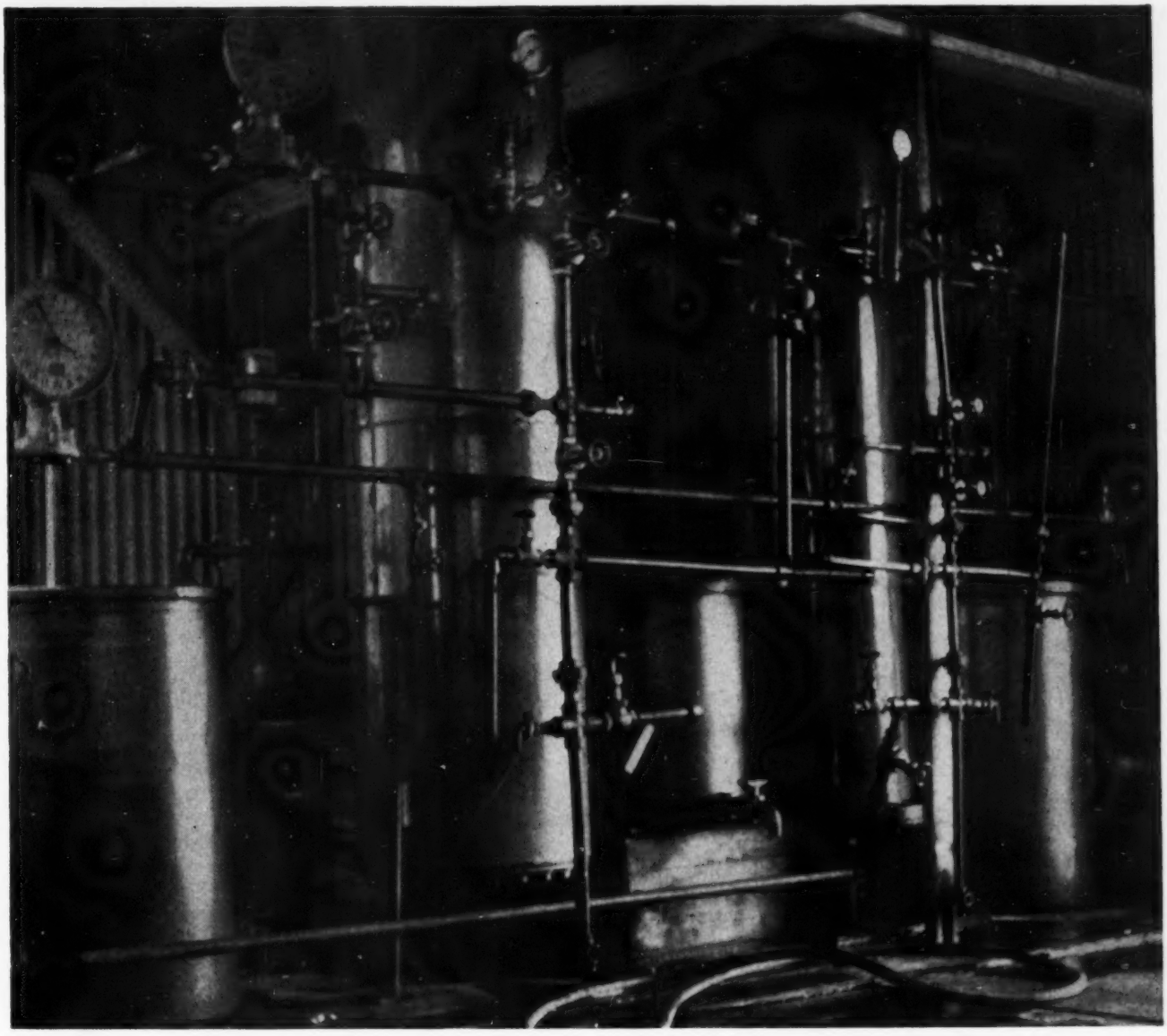
Demineralizing water by successive cation and anion exchange to produce a water of distilled water quality has been widely applied in recent years[64] and is a typical example of the complete removal of undesirable electrolytes by ion exchange.

The process has also been applied to the de-ashing of solutions of non-electrolytes such as the purification of sugar solutions was described by Rawlings and Shafor.[50] Weitz[68] has described a plant installation in a beet sugar factory, including operational and cost data obtained during the 1941 campaign. In addition to improved sugar yield, the treatment resulted in the complete elimination of evaporator fouling by scale-forming salts and of tube and valve corrosion by ammonia. Actually 94% of the inorganic non-sugars and 83% of the organic non-sugars were removed by the process.

Holmes[27] has patented a demineralizing procedure for de-ashing gelatin solutions.

Addition of Material. During the displacement of undesirable ionic impurities from solutions by ion exchange, less harmful ions are being added to the solution. In addition to the negative benefit implied in this statement, it is also possible to add specific ions to a solution.

Salts of both cation and anion exchangers have been used in synthetic soils for plant nutrition studies, allowing known amounts of specific ions to be supplied.[16, 34, 55]



Pilot plant for demineralizing sorgo juice by ion exchange. This plant was installed in cooperation with the Bureau of Agricultural and Industrial Chemistry, U. S. Department of Agriculture.

Austerwell[6] used a cobalt cation exchanger for the purification of cobalt nitrate solutions. The other cations were absorbed by the cation exchanger, liberating an equivalent amount of cobalt.

An anion exchanger sulfide, prepared by the adsorption of hydrogen sulfide by an alkali-regenerated anion exchanger, may be used as a source of sulfide ions for the precipitation of Group II metals in qualitative analysis.[21]

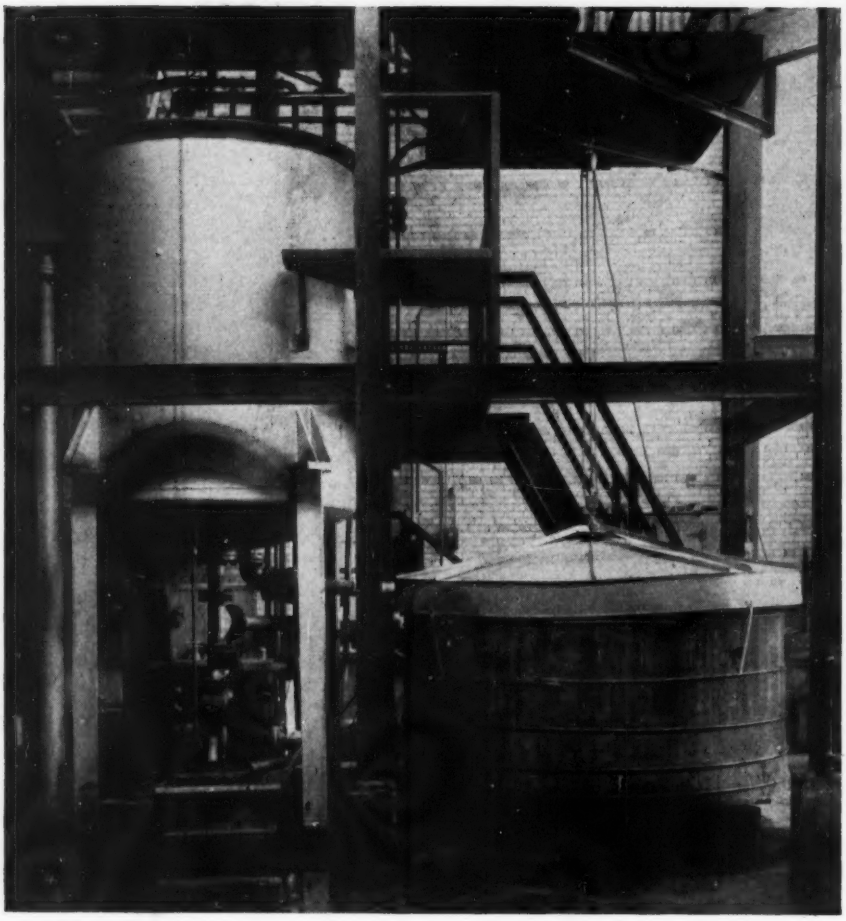
This general type process is the basis for the syntheses of many salts by use of cation exchangers. Norsk Hydro is said to have operated a cation exchange process for the preparation of calcium and sodium nitrates from lime, air, and seawater.[45] The utility of the process depended upon an unusual set of circumstances including close proximity of seawater and cheap hydroelectric power for the fixation of atmospheric nitrogen by the arc process.

Recovery of Material. Ion exchange processes are frequently used for the recovery of valuable substances from solutions. For example, specific metals or groups of metals have been absorbed on cation exchangers for analytical purposes.[1] Cation exchange has been used abroad for the recovery of copper from cuprammonium rayon waste liquors.[46, 47] Non-metallic cations are also recovered in this manner in two widely used analytical procedures: the thiochrome assay for vitamin B_1[26, 67] and the Folin method for ammonia nitrogen.[19] The recovery of nicotine,[63] quinine,[5] and other alkaloids[66] by cation exchange methods has been reported and is being further developed.

Likewise, valuable anions may be recovered by the use of anion exchangers. Matchett[37] developed such a process for the recovery of tartrates from grape wastes. While a pilot plant was installed and operated at Lodi, California, some time ago, it is believed that no commercial development has taken place. More recently, metals capable of forming complex anions have been recovered by anion exchange.[58]

In addition to true anion exchange, valuable acids may be recovered by adsorption on alkali-regenerated anion exchangers. Matchett has published another tartrate recovery paper involving such a process on a laboratory scale.[38] A different ion exchange tartrate recovery process which gives promise of commercial feasibility has been developed by the Permutit Company and will be reported in a later publication. Nachod[42] has patented the recovery of the complex acids of the precious metals by means of anion exchangers.

Separation of Electrolytes. The separation or fractionation of elctrolytes may often be effected by ion exchange. Much work has been done on such separations and the improved ion exchangers now available have made ion exchange a valuable tool for the separation of cations from anions for analytical[20] and other purposes. Separation of amino acid mixtures has proved to be a useful research tool and shows promise of commercial utility. The separation is effected by use of cation



A cation exchanger, Zeo-Karb H, is used to remove metallic impurities in the manufacture of pectin at the Universal Colloid Co., McAllen, Texas. Above are the Zeo-Karb regeneration tank and regenerated Zeo-Karb H storage tank.

exchangers to absorb those acids having an excess of amino groups over carboxyl groups, while anion exchangers absorb the polycarboxylic mono amino acids; the mono amino-mono carboxylic acids passing through both exchangers and appearing in the effluent.[9, 17]

Cations of strong bases can be separated from those of weaker bases, anions of strong acids can be separated from those of weaker acids, and the strong acids themselves can be separated from weaker acids. Among the basic amino acids, a considerable degree of separation was effected at an early date[18, 19] and these results have been considerably improved with the improved materials and techniques now available.[8, 12]

Since ions of higher valence are retained more firmly than ions of lower valence under equivalent conditions, it is generally practical to effect a separation of such ions by means of cation exchangers or anion exchangers. The usual water softening process illustrates this. Divalent calcium and magnesium ions displace monovalent sodium ions from the exchanger bed. Likewise, in the anion exchange process, the divalent sulfate ions will effectively displace the monovalent chloride ions from the exchanger bed.

Some separation is also possible between ions having the same valence but different atomic weights or atomic numbers. An I. G. Farbenindustrie patent[28] gives data on the partial separation of copper and zinc by a cation exchange resin. A siliceous cation exchanger was used by Russell and Pearce[53] for the fractionation of the rare earths, while Taylor and Urey[59] were able to effect some separation of isotopes by means of a cation exchanger.

Contact Materials. The applications so far mentioned clearly employ ion exchange reactions. Ion exchange materials are also employed as contact materials in which ion exchange may or may not be a function. Acid-regenerated cation exchangers have been patented as solid acids in the preparation of resins.[15] The inorganic acid-treated cation exchangers are excellent for oil decolorization[32] and the anion exchangers function as solid bases in the catalysis of the pentaerythritol synthesis according to a recent patent.[57]

Inorganic zeolites derived from almost every metal of the periodic system have been prepared and used as catalysts in a wide variety of reactions. Possibly the best known of these are the vanadium catalysts of Jaeger[29] which have been patented as oxidation catalysts. Many patents describe the application of these and related products to the catalysis of many other types of reactions. The lead cation exchanger catalyzed preparation of methyl, vinyl ketone from acetone and formaldehyde has been patented.[10]

Ion exchangers have also been applied widely as insecticides and fungicides. The nicotine derivatives of such natural cation exchangers as peat,[36] humates,[36] and bentonite[56] are widely used, and nicotine salts of synthetic organic cation exchangers also have value.[51] Copper zeolite fungicides have been sold commercially.[52]

Miscellaneous Uses. There is a final group of miscellaneous uses for materials which are normally used for their ion exchange properties. Such processes as the preparation of potash salts,[65] ultramarine,[22] and glaucosil[65] from greensand should be noted here. Alsifilm, a mica-like synthetic inorganic zeolite-type product, is prepared from bentonite.[25] Ceramics may be modified by including a hydrous sodium aluminosilicate gel in the mix, precursor of the precipitated gel cation exchangers.[14]

The chemical literature contains references to hundreds of additional applications of ion exchange but those presented in the preceding paragraphs suffice to illustrate the principles and scope of ion exchange.

LIMITATIONS

Because of the necessity for regenerating the exchanger bed at intervals ion exchange suffers from the disadvantages common to all batch processes. Semi-continuous operation can be achieved by the use of multiple beds so that one or more may be operating while others are regenerating. Continuous ion exchange and regenerating processes have been described in a group of Carl Nordell patents.[43] Here the ion exchangers are continuously transferred from the exhausted portion of the bed to a regenerating and rinsing chamber. Simultaneously a corresponding volume of regenerated exchanger is returned to the bed.

Ion exchange processes are limited to solutions of relatively low concentration. This limitation is imposed principally by the capacities of the exchangers since, as the electrolyte concentration increases, the volume of solution which may be treated before exhaustion of the exchanger, decreases until eventually a point is reached where the volume of liquid treated is less than that of the exchanger.

For example, the usual demineralizing process has been suggested for the production of drinking water from seawater. An average seawater contains about 600 meq/L (milliequivalents per liter) total electrolytes. With a cation exchanger capacity of 500 meq/L and an anion exchanger capacity of about 750 meq/L, a simple calculation shows that it would require a total of 2 liters of exchangers to desalt one liter of seawater. Obviously, such a process is out of the question for emergency use, since it would be better to carry the 2 liters in the form of fresh water. Fortunately, a different and more

efficient chemical process is available for this purpose in the form of the Permutit Seawater Desalting Kit, which yields about eight times its own volume of potable water.[3, 21]

It is sometimes possible to employ special operating procedures to overcome the handicaps of high electrolyte concentrations as in the use of multiple demineralizing for the treatment of brackish water supplies.[64]

Dilution of the liquid being treated becomes serious in some cases where it is necessary to maintain maximum concentrations. Special procedures can be used to minimize this drawback.

The amount of regenerant required for ion exchange processes is almost invariably more than that theoretically required on the basis of the exchange reactions taking place during the adsorption and regeneration. However, careful plant design, especially counter-current regeneration, can reduce the excess regenerant to a minimum. Regenerant consumption of only 1.2 times the theoretical with anion exchangers and 1.5 times the theoretical with cation exchangers has been obtained regularly in plant installations and even lower regenerant consumption is sometimes obtained.

Where valuable substances are being recovered, they are obtained as only relatively concentrated solutions, thus requiring considerable evaporation or other concentration before obtaining the pure solute. In several ion exchange processes handling influent liquors containing less than 0.1% of solute, recovery effluents containing 5-10% of solute are obtained. Operating procedures leading to the recovery of more concentrated solutions have been suggested and are being further developed.

While the initial cost of some of the exchangers may seem relatively high, they are very long-lived in most applications so that the cost may be amortized in a manner similar to the costs of the equipment in which the process is applied. There are plant installations in which the exchangers have been operated for thousands of cycles.

Ion exchange operating costs depend upon the type of exchanger required, the quantity and nature of the electrolytes present in the feed solution, the amount of electrolyte removal required, and the nature of the regenerant used. Costs for a typical process, demineralizing water, were given by Tiger and Sussman.[64] Figure 1, reproduced from this paper, may be used for estimating demineralizing costs, assuming chemical costs of 2 cents per pound for 66° Be sulfuric acid, and 2 cents per pound for soda ash. Large users of these chemicals can often obtain them for considerably less than the above conservative costs. Labor costs in any ion exchange process will vary with the quantity of electrolytes present in the feed solution, the nature of the operating cycle, and the type and design of equipment.

While ion exchange is definitely out of the question for some processes, there are many border-line cases in which the apparent disadvantages may be overcome by combining a sound chemical process with good engineering design and equipment. Here the *know-how* resulting from long experience in handling both ion exchangers and ion exchange equipment can often determine the success or failure of a process.

TYPES OF EXCHANGERS

There has been a tendency on the part of many to consider ion exchangers solely from the point of view of exchange capacity. Experience indicates, however, that this viewpoint is very misleading.[60] As pointed out above, the proper design of equipment and process has a great influence upon the results obtained, and in evaluation of the exchange material itself. Such factors as life, resistance to aggressive attack under the operating conditions, reaction and regeneration efficiency and speed, other chemical and physical characteristics, and initial cost may often outweigh exchange capacity.

In appearance the ion exchangers are granular insoluble solids, generally supplied in the 10-60 mesh size range, and may vary in color from the white of the precipitated gel-type cation exchangers, through the green of the glauconites and the brown of the anion exchangers, to the black of the organic cation exchangers. The industrially important ion exchangers are generally classified according to the following scheme:

I. Cation Exchangers
  A. Inorganic (siliceous)
    1. Natural (processed greensands and clays)
    2. Synthetic (precipitated gel zeolites)
  B. Organic
    1. Coal and lignite derivatives
    2. Resins (phenolic sulfonic acid derivatives)

II. Anion Exchangers
  A. Inorganic
    1. Hydroxyapatite (fluoride adsorbent)
  B. Organic
    1. Basic dyestuffs (aniline black)
    2. Resins (amine derivatives)

As the properties of the various exchangers have been described adequately elsewhere,[40, 44, 61, 64] it is sufficient to point out the extent of variations in properties here.

Among the cation exchangers, the inorganic products may be used only on the salt cycle while the organic materials may be used on both hydrogen and salt cycles. Capacities vary from 2,500 grains (as $CaCO_3$) per cubic foot for the processed greensands to upwards of 10,000 grains (as $CaCO_3$) per cubic foot for the precipitated gel zeolites and organic cation exchangers. Densities, as shipped, may be as low as 30 pounds per cubic foot for organic products to 90 lb. per cubic foot for processed greensands. pH limitations vary from the very broad range permitted with the organic exchangers to the narrow recommended pH range 6.8-8.3 for the precipitated gel zeolites. In installed cost, the greensand derivatives are least expensive while the organic materials are generally the most expensive.

Hydoxyapatite, the sole commercial inorganic anion exchanger, is used only for the removal of fluorides from water supplies. While basic dyestuff type anion exchangers are still operating in commercial installations, they are no longer manufactured in this country because of their low capacity and color throwing tendencies. The various synthetic resin anion exchangers are rated at 12,000-20,000 grains (as $CaCO_3$) per cubic foot, but actual capacities are very sensitive to the nature and concentration of the adsorbed anions. These products run

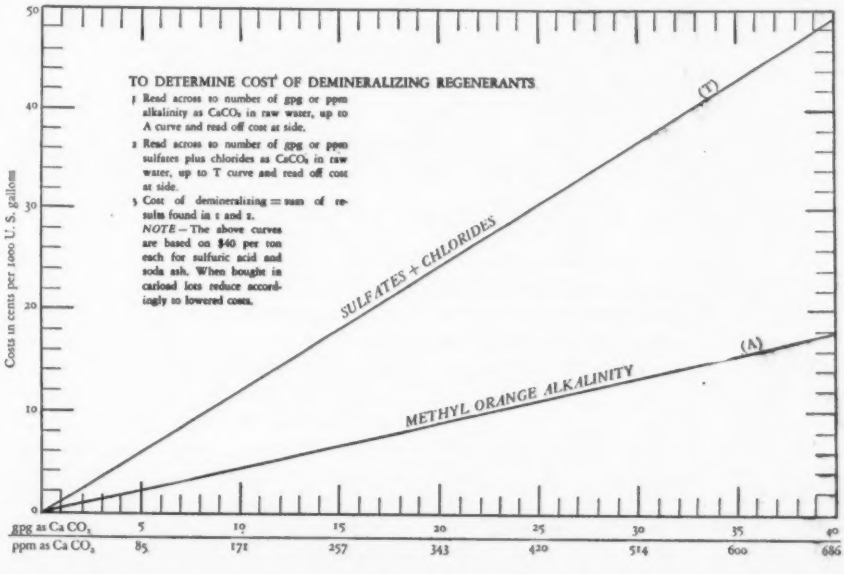
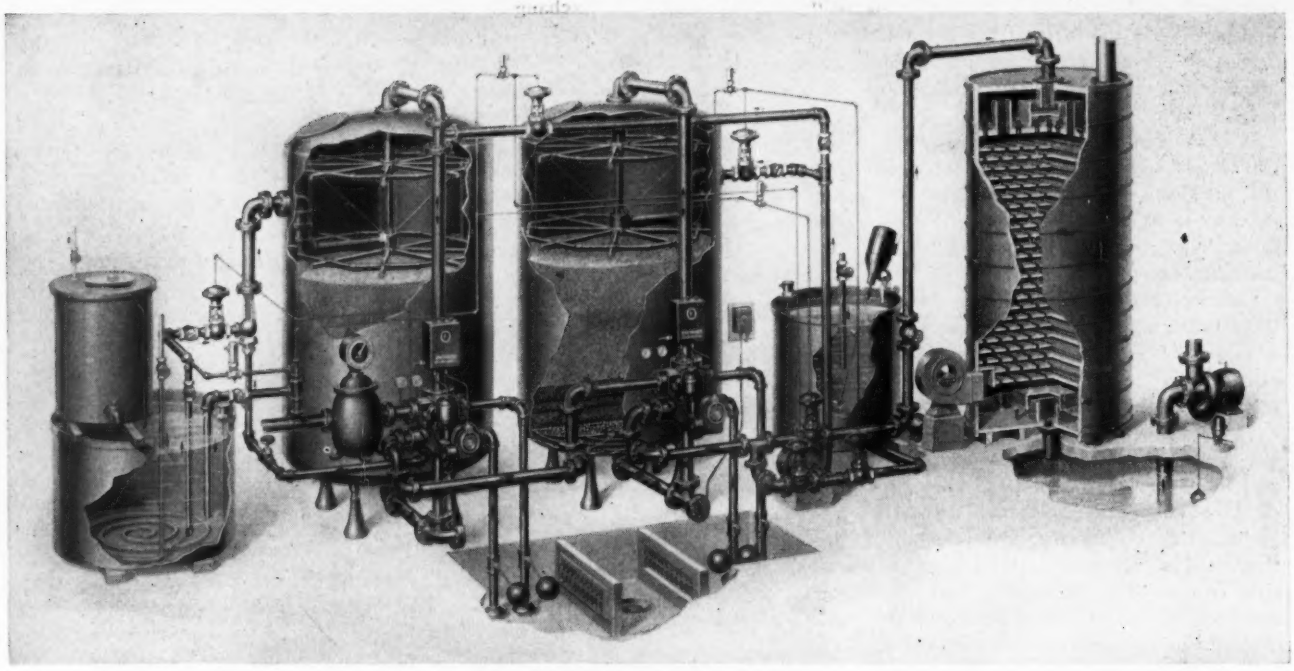
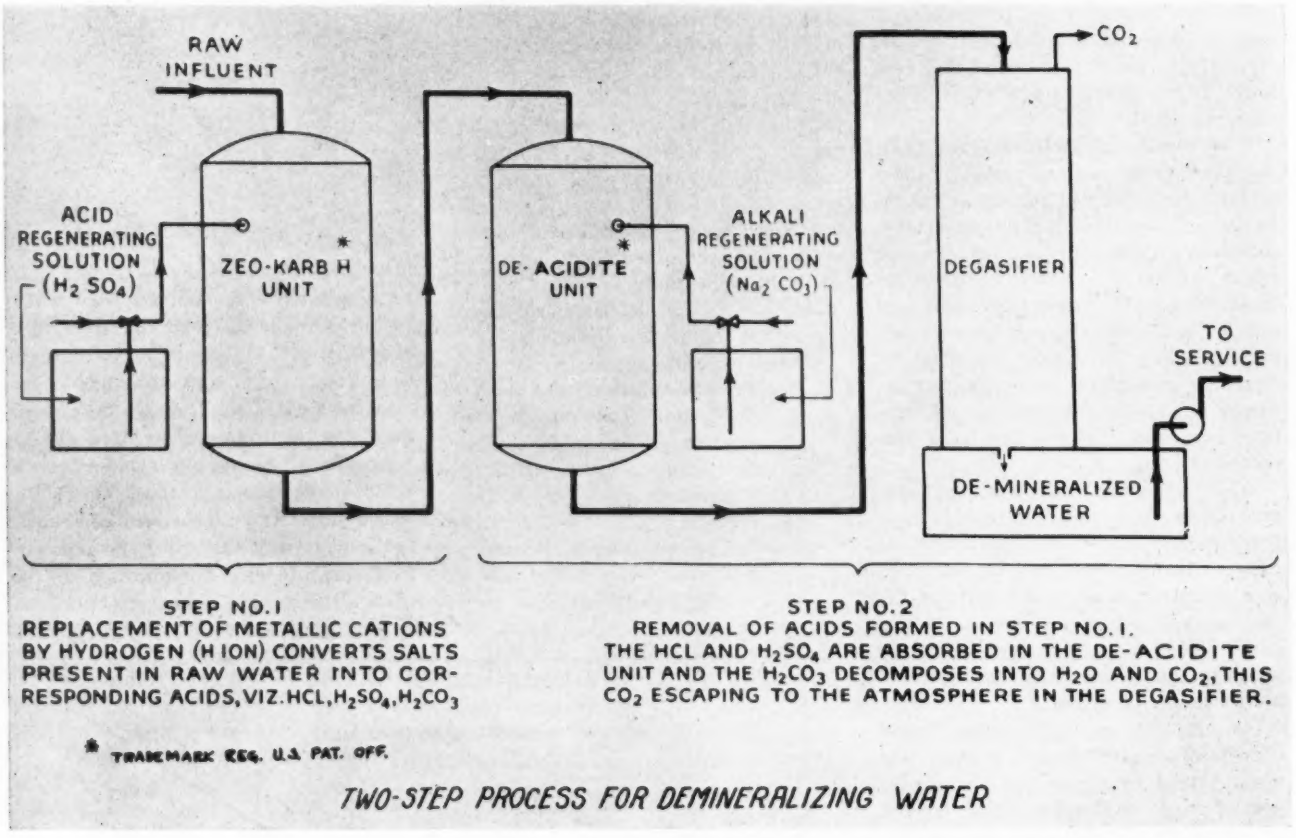

TO DETERMINE COST OF DEMINERALIZING REGENERANTS
1 Read across to number of gpg or ppm alkalinity as CaCO3 in raw water, up to A curve and read off cost at side.
2 Read across to number of gpg or ppm sulfates plus chlorides as CaCO3 in raw water, up to T curve and read off cost at side.
3 Cost of demineralizing = sum of results found in 1 and 2.
NOTE — The above curves are based on $40 per ton each for sulfuric acid and soda ash. When bought in carload lots reduce accordingly to lowered costs.
(T)
SULFATES + CHLORIDES
(A)
METHYL ORANGE ALKALINITY
Costs in cents per 1000 U. S. gallons
0
10
20
30
40
50
gpg as Ca CO3
5
10
15
20
25
30
35
40
ppm as Ca CO3
85
171
257
343
420
514
600
686

Fig. 1—Chart for the determination of the cost of reagents used in water demineralization.




RAW INFLUENT
ACID REGENERATING SOLUTION (H_2SO_4)
ZEO-KARB H UNIT
DE-ACIDITE UNIT
ALKALI REGENERATING SOLUTION (Na_2CO_3)
CO_2
DEGASIFIER
TO SERVICE
DE-MINERALIZED WATER
STEP NO. 1
REPLACEMENT OF METALLIC CATIONS BY HYDROGEN (H ION) CONVERTS SALTS PRESENT IN RAW WATER INTO CORRESPONDING ACIDS, VIZ. HCL, H_2SO_4, H_2CO_3
STEP NO. 2
REMOVAL OF ACIDS FORMED IN STEP NO. 1. THE HCL AND H_2SO_4 ARE ABSORBED IN THE DE-ACIDITE UNIT AND THE H_2CO_3 DECOMPOSES INTO H_2O AND CO_2, THIS CO_2 ESCAPING TO THE ATMOSPHERE IN THE DEGASIFIER.
* TRADEMARK REG. U.S. PAT. OFF.
TWO-STEP PROCESS FOR DEMINERALIZING WATER

Water demineralization by ion exchange. L. to r.: acid regenerant tanks, cation exchanger, anion exchanger, alkali regenerant tank, degasifier.

from 30 to 50 pounds per cubic foot, are useful over an almost unlimited pH range, and are the most expensive of the ion exchangers.

EQUIPMENT

Good ion exchange materials alone cannot lead to satisfactory performance unless the equipment in which the exchangers are used is well designed and constructed.

The fundamental design and operational features of ion exchange equipment have been well developed during the course of thirty-odd years' experience with water treatment processes. This information is directly applicable to equipment for non-water treatment ion exchange processes, when modified in accordance with the nature of the process under consideration.

While batch operation is sometimes used, as in the previously mentioned Universal Colloid pectin process, ion exchange reactions are generally carried out by passing the solution through a bed of ion exchanger contained in a shell. The ion exchanger is supported by layers of screened and graded gravel or anthracite coal, or by a false bottom. The design of the collecting system beneath the gravel must provide good distribution of backwash water and efficient collection of the rinse waters to obtain satisfactory performance.

Operation may be conducted either by

gravity flow or under pressure. For gravity treatment the shell may be an open one of concrete, wood, steel, or other suitable material of construction. For pressure work, of course, a closed shell is required. Whichever type of operation is used, the equipment is fitted so that the solution being treated is uniformly distributed and passed through the ion exchange bed without channeling. Efficient distribution of the regenerant solution, rinse water, and backwash must be provided for economical operation and satisfactory performance.

Theoretically, the ion exchange reactions should take place with equal efficiency whether the solution is passed upflow or downflow through the ion exchange bed. In practice, however, downflow operation is generally preferable because any flow rate up to a practical maximum can be used. In contrast, the flow rate for upflow operation must be high enough to keep the bed in a semi-suspended condition and yet not so high as to carry the exchanger out of the shell. The rate of flow must be kept between these two limits in order to obtain uniform contact.

The diameter of ion exchanger beds varies from 16 millimeters for semi-micro scale laboratory work to 24 feet for a large water treatment plant. To eliminate the necessity for field welding steel shells are generally not over 11 feet in diameter.

Materials of construction are usually wood or steel for exchange reactions where corrosion is not a factor. For demineralizing, or other processes where corrosion is a problem, such as those processes employing acid-regenerated cation exchangers, equipment is usually rubber-lined steel for pressure units, and wood with rubber-lined and covered steel fittings for gravity units. Of course, other construction materials such as stainless steel, glass-lined steel, or other special materials can be used when desirable.

Semi-automatic and automatic equipment has been highly developed in connection with water conditioning and can also be used in other exchange applications. Among the advantages of this type of equipment are:

1. Uniform performance.
2. Reduction of the chance of errors in operation.
3. Labor savings.

Semi-automatic and automatic operations are carried out using multiport valves, or a master pilot valve opening and closing diaphragm or hydraulic valves. During cyclic operations, such as backwash, regeneration, and rinse, the controls solve the problem of how to operate the valves because the sequence of correct valve operation and the length of time in these positions is automatically controlled. The problem of when to initiate the sequence of operations is solved automatically by the use of a time switch, volume measurement, or pH or conductivity instruments.

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CUBAN ALCOHOL CAPACITY UP

A TABULATION in the *Anuaric Azucarero de Cuba* for 1944 reveals some interesting data on Cuban alcohol production.

Cuba's rated 95% alcohol *capacity* is indicated as 94.3 million U. S. wine gallons annually, on a 300 day, 24 hour basis. This value is the sum of the production capacities for 95% alcohol and "high wines" (aguardiente). Actual annual production of 93% alcohol, however, is given as follows (converted to U. S. wine gallons):

1940— 9.8 million
1942— 6.6 million
1943—30.5 million
1944—highest month, March, 4.75 million, or at a rate equivalent to 57 million gallons per year.

In addition to the above-noted production of 95% alcohol, there is a relatively small volume of production of "high wines" (aguardiente), which is sold without being rectified. Expressed in terms of equivalent 190 proof gallons, this production of "high wines" is given as follows:

1942—5.0 million gallons
1943—3.2 million gallons
1944—March production rate, 182,000 gallons, or 2.26 million gallons per year.

It is interesting to note that Cuba's current *rated* capacity is at least two-thirds of total United States normal prewar industrial alcohol production, which was in the range of 100-150 million gallons annually.

To operate present Cuban distilleries at *rated* capacity would require 230 million gallons annually of molasses, blackstrap basis, which is more than Cuba's total normal 200 million gallon blackstrap output and would require approximately 20-30 million gallons of invert in addition to using up all blackstrap normally produced for export.

Of the 66 alcohol distilleries listed for Cuba, 28 new distilleries, representing an installed rated capacity of 16 million wine gallons, were established in 1943; installation of 28 more distilleries in 1944 further increasing rated capacity by 42 million gallons per year.

Under the recent CCC purchase the United States is buying 20-28 million gallons of Cuban alcohol at 65¢ per wine gallon, 190 proof.

The prewar import duty on Cuban alcohol was 12¢ per gallon, 190 proof basis (15¢ per gallon less 20% as per 1934 Cuba Trade Agreement.)

A.I.Ch.E. Meets in Philadelphia

EXTRACTIVE AND AZEOTROPIC DISTILLATION was the subject of the symposium which featured a new type of meeting of the American Institute of Chemical Engineers, sponsored by the Philadelphia-Wilmington Section on April 10.

A NEW TYPE of program was pioneered by the Philadelphia-Wilmington Section of the American Institute of Chemical Engineers in its meeting at the Benjamin Franklin Hotel in Philadelphia on April 10. The registration was 410, comparable to that of many of the national meetings of the Institute.

The program began with an afternoon symposium in which attention was focused on the growing importance of extractive and azeotropic distillation in the solution of many difficult separation problems. All of the six papers presented had previously been accepted for presentation at the Institute's cancelled regional meeting at Houston, Texas. Robert R. White of the Department of Chemical Engineering at the University of Michigan presided.

The informal dinner was preceded by a social hour at which refreshments were served. Albert B. Newman, vice-president of the Institute, spoke after the dinner and discussed "The Chemical Engineer as a Member of a Profession." In comparing the qualifications of a professional man with those of one in non-professional employment, Dr. Newman emphasized the necessity of producing men with "trained imaginations" rather than men with mere superficial facility.

Definition

In the initial paper by Manson Benedict and Louis C. Rubin of the M. W. Kellogg Company, Dr. Benedict noted that extractive and azeotropic distillation were similar in that another substance, usually non-reactive, was added to the mixture during the purification process. In the case of extractive distillation this supplementary material, preferably non-volatile, is generally introduced near the top of the fractionating tower, eventually progressing under the influence of gravity to the bottom of the tower where it is withdrawn for purification before reuse. In azeotropic distillation the added material must be within the same boiling range of the materials being separated and can be added at any point in the fractionating equipment as ebullition will soon carry it to all parts of the system. Dr. Benedict stated, however, that it was very difficult to make a precise differentiation between the two procedures as in some cases there is azeotrope formation and boilup solvent, particularly in the latter stages of extractive distillation.

As advantages of extractive distillation over azeotropic distillation, Dr. Benedict listed: the larger number of available solvents as the volatility of the solvent in the case of extractive distillation is less critical; greater flexibility because of the larger number of solvents available and greater range of conditions that it is possible to employ; and finally the large saving in cost because of the steam economy, impossible in the case of azeotropic distillation because of the necessity of solvent vaporization.

The primary advantage of azeotropic distillation over extractive distillation is that it is not necessary to provide a method for continuously charging the solvent since the boilup is sufficient to keep it distributed throughout the system. This is particularly advantageous in laboratory distillations.

Correlation of Data

Vapor-liquid equilibria in non-ideal solution was the subject of a paper by Robert R. White of the University of Michigan, Dr. White presented an empirical method utilizing the van der Waal constants for the correlation of data and design of fractionating towers for extractive distillation. In the following paper H. G. Drickamer of the Pan-American Refining Company described the extractive distillation of hydrocarbons with phenol, particular attention being paid to the separation of toluene. In this study Mr. Drickamer developed experimental data which checked the methods of calculation developed by Dr. White in the previous paper and in addition showed that Dr. White's method of calculation was suitable for the design of commercial equipment.

In a second paper from the M. W. Kellogg Company by C. A. Johnson, R. Solomon, L. C. Rubin, and Manson Benedict, another method was presented by Dr. Benedict for the evaluation of experimental data. This method is completely empirical and a study of the system, methanol-heptane-toluene, was used in its development. This system was utilized as being typical of all hydrocarbon separations, realizing, of course, the dissimilarity of olefinic materials, naphthenes, and other types of hydrocarbons which may be found in refinery fractions.

A. P. Colburn of the University of Delaware in a study of "The Selection of 'Separating Agents' for Azeotropic and Extractive Distillation and for Liquid-Liquid Extraction" called attention to the great importance of solvent selectivity in the choice of a solvent to be used in any of the three operations mentioned in the title. He further noted the similarity in the methods of treating the problems of extractive and azeotropic distillation and those of liquid-liquid extraction.

Use in Chemical Reactions

The last paper was delivered by C. E. Leyes, of the Celanese Corporation. It dealt with his work with D. F. Othmer at the Polytechnic Institute of Brooklyn on the continuous esterification of butanol and acetic acid. Dr. Leyes' paper was of particular interest since it dealt with the theoretical aspects of azeotropic distillation as used to force the completion of a chemical reaction by continuous removal of the product. Previous papers described studies of straight physical separations. In addition to the factors complicating straight separation processes, the rate of reaction and the heat of reaction provide additional difficulties in any theoretical study of this type. Dr. Leyes' paper was an effort to arrive at a means for evaluating such a process without experimentation that would require expensive equipment. However, the proposed method is tedious.

GLYCERINE BY FERMENTATION OF GLUCOSE

AS AN outgrowth of investigations carried on during the past two years by the Canadian National Research Council on the production of laevo-2,3-butylene glycol by the aerobacillus method, laboratory studies are now being conducted for the production of glycerine.

In the original glycol work, which is now in the pilot plant stage, the end products are laevo-2,3-butylene glycol and ethanol, whereas the Council's laboratory studies of *bacillus subtilis* reveal that this fermentation yields laevo- and meso-2,3-butylene glycol, in approximately equal proportions, and glycerine, as the major products. Thereby it differs from both the *aerobacillus*, which yields pure laevo, and the *aerobacter*, which produces a meso-dextro mixture. As some *bacillus subtilis* strains hydrolyze starch actively, direct fermentation of starch would also be a possibility.

The laboratory yields, calculated on 100 pounds of glucose, are 2,3-butylene glycol, 28.5 pounds; glycerol, 20.4 pounds; lactic acid, 10 pounds; ethanol, 3.3 pounds; formic acid, 1.3 pounds. This accounts for 63.5 pounds of the sugar, leaving 36.5 pounds lost as carbon dioxide or consumed in the growth of the bacteria.

It is emphasized by Council scientists, however, that these laboratory studies have just recently been initiated, and the glycerol fermentation development is now in about the same stage as was the original butylene glycol discovery in 1906.

HEADLINERS in the NEWS

ARTHUR SCHRODER, executive director of the American Institute of Chemists, assumed his new duties May 1, upon leaving the office of the Alien Property Custodian.

DR. W. F. ZIMMERLI has resigned as vice-president of General Aniline & Film Corp. in order to engage in private practice as a consultant in the chemical industry.

A. W. BEVERNICK, for the past ten years western manager of R. J. Prentiss & Co., has been elected vice-president. He will continue in Chicago.

H. W. FISHER, manager of the chemical products division of Standard Oil Company of New Jersey, has been elected a director of the company.

RALPH B. OESTING will direct research and development at the Paul-Lewis Laboratories, Inc. Mr. Oesting was previously connected with Oscar Mayer & Co. and Swift Co.

F. S. ELFRED, JR. has been appointed general manager of the Explosives Division of Olin Industries, Inc. and its subsidiaries, with whom he has been connected since 1937.

WILLIAM H. McCONNELL, assistant director of sales for Diamond Alkali Co., was formerly vice-president of the Benner Chemical Co., distributors for Diamond Alkali products.

WILLIAM S. RICHARDSON has been appointed president of the newly established B. F. Goodrich Chemical Co. Mr. Richardson is also a vice-president of the Hycar Co.

A. I. Ch. E. Holds Symposium

The Philadelphia-Wilmington Section of the American Institute of Chemical Engineers held a symposium on April 10, at the Benjamin Franklin Hotel in Philadelphia. The subject "Extractive and Azeotropic Distillation" was discussed in six papers which were presented during the afternoon. After dinner, Dr. Albert B. Newman, vice-president A. I. Ch. E., and dean of engineering, College of the City of New York, addressed the group on "The Chemical Engineer as a Member of a Profession." Shown at left, seated from left to right, are: Dr. Newman, James G. Vail, vice-president and director of Philadelphia Quartz Co., who acted as toastmaster at the dinner, and Melvin C. Molstad, head of the Department of Chemical Engineering, University of Pennsylvania, and chairman of the Philadelphia-Wilmington Section.

Seated at dinner from left to right are Raymond P. Genereaux, E. I. du Pont de Nemours & Company, and Robert R. White of the University of Michigan, who presided.

Standing from left to right are R. Solomon and Manson Benedict of the M. W. Kellogg Company, who were two of the collaborators on "Separation of Toluene Paraffins." H. G. Drickamer, Pan American Refining Company who presented the third paper, and Charles C. King, of M. W. Kellogg are next.

Charles E. Leyes of the Plastics Division, Celanese Corporation of America, is standing with A. P. Colburn, Professor of Engineering, and E. M. Schoenborn, Professor of Chemical Engineering, both of the University of Delaware, who discussed selection of "Separating Agents for Azeotropic and Extractive Distillation."

At the dinner table, sitting from left to right, are James C. Lawrence, E. I. du Pont de Nemours & Company, and J. L. Bennett, Hercules Powder Company, directors of A. I. Ch. E.

Columbia Professor Awarded Nobel Physics Prize

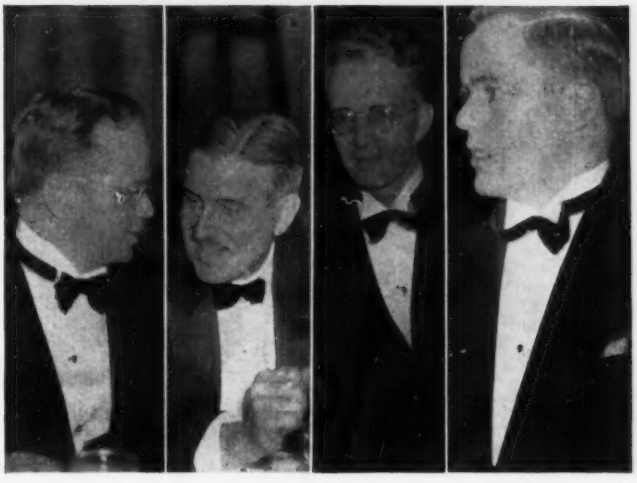
Professor Isidor Isaac Rabi is shown at right receiving the 1944 Nobel Prize in Physics from Dr. Nicholas Murray Butler (left). The award was presented to Dr. Rabi, 46-year-old professor of physics at Columbia University, for his discovery of a new method of measuring and studying the magnetic properties of the atomic nucleus.

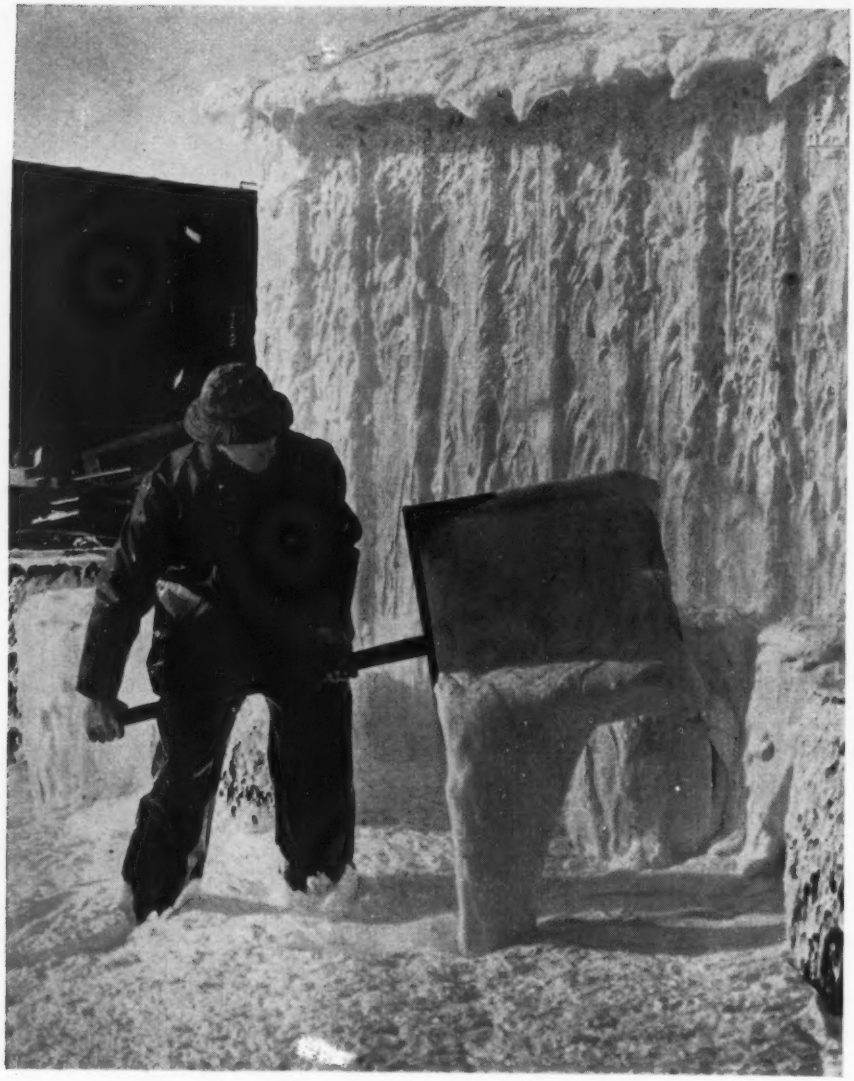
Pittsburgh A. C. S. Honors Chairman Emeritus Stahl

Standing at left, from left to right are: Dr. Ernst Berl, Dr. H. K. Work, chairman of the Pittsburgh Section of the American Chemical Society, and Dr. Karl F. Stahl, chairman emeritus of the section. A reception and dinner at the University Club marked the occasion of Dr. Stahl's ninetieth birthday.

Society of Chemical Industry Holds Electronics Symposium

A symposium on the application of electronics to chemical industry was held at the Hotel Roosevelt, April 20, 1945. Led by Mr. Elmer Engstrom, the program was arranged so that each speaker presented a ten minute talk on a specific subject. Photographed before dinner, from left to right in the top row are: Dr. G. H. Brown, Dr. L. P. Smith and Dr. C. B. Jolliffe. Below are: Mr. Engstrom, Dr. Norman A. Shepard, chairman of the American Section, S. C. I., Mr. H. W. Leverenz and Dr. J. Hillier. All the men are connected with the R. C. A. Laboratories at Princeton, New Jersey.

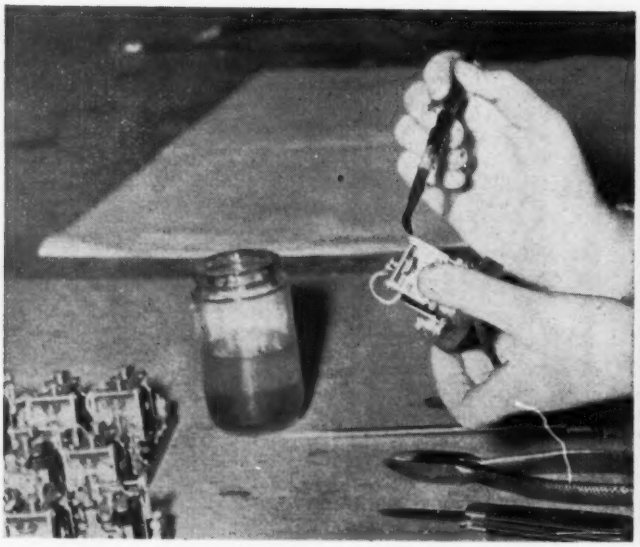




Fire-Fighting Foam From Soy Beans

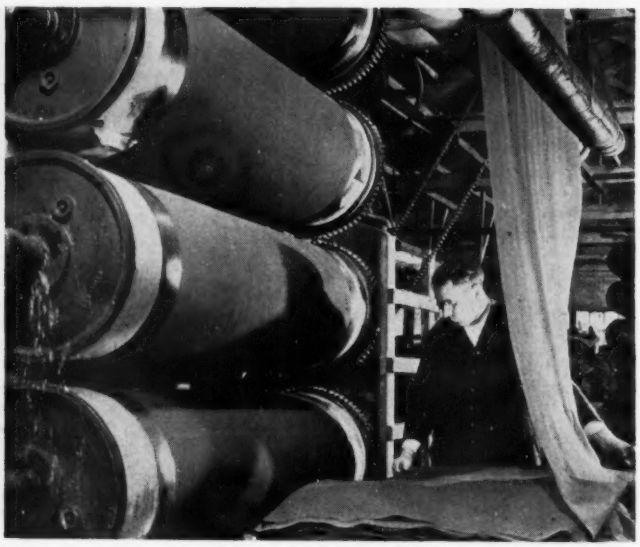
This thick blanket of foam, which consists of water, air and a foaming agent derived from hydrolized protein of soybean meal, is particularly effective in extinguishing petroleum and chemical fires. The soybean constituent is said to be superior to animal protein for the purpose in that it is more easily preserved and yields a more stable foam. The compounded material also contains bactericides and anti-oxidants for their preservative action, and glycols for additional foam stability. It meets a particularly difficult requirement in that it is equally serviceable with hot or cold, fresh or salt water. The foam is produced simply by spraying water through a proportioning nozzle, which siphons up the liquid in the ratio of 6 per cent agent to 94 per cent water. With this mixture is incorporated 10 times its volume of air, producing nearly 900 gallons of foam from five gallons of the proteinaceous liquid. The fire-extinguishing material flows freely, yet sticks to vertical surfaces as well as flat areas. Over four million gallons of the basic liquid have been manufactured by National Foam System.

Brush Applied Fungicide



A small camel's-hair brush is the instrument used to apply fungicidal solution to relay pivots. Without this precautionary treatment electrical apparatus is soon clogged in tropical climate.

Resin Treating Tent Cloth



Use of alkyd resins to treat Army duck yields longer wearing, fungi resistant cloth. After impregnation the cloth is passed through a drying tunnel which collects and returns the vaporized solvent for reuse.

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BETWEEN THE LINES

Whither Magnesium?

There is growing preoccupation in Congress and among numerous Federal agencies with the industrial possibilities after the war in the field of light metals, particularly magnesium. Proponents of an expanded industry believe that war uses have opened an entirely new outlook for this chemically-produced metal.

DETAILED hearings are being concluded before a Senate committee on all phases of the magnesium industry and the passible uses of this and other light metals in postwar industry. Because of its international character and the possibility that as a relatively new and susceptible industry it may require protection, the U. S. Tariff Commission has also been studying all the ramifications of magnesium production, public and private. From these varied sources it is possible to get a fairly comprehensive perspective, pertinent parts of which are summarized here.

Production has mounted from 6,700,000 pounds in 1939 to more than 368,000,000 pounds in 1943. Instead of one plant producing magnesium, as in pre-war days, 16 plants each with several times the capacity of the one prewar plant, are or were engaged in war production of magnesium, and these were managed by a total of 12 companies owned outright by the Government, or operated for Government account.

Moreover, expansion of the industry has been almost entirely financed by the Government, says the Tariff Commission, the Government owning 13 plants which account for 90 per cent of the total capacity. The question engaging interested members of Congress, as well as Federal agencies, arises from the current belief that only a small part of the present production can be fully utilized during the immediate period following the war.

Most of the magnesium now produced is used in the form of alloys for structural purposes, notably in aircraft manufacture, but also in parts for rapidly-moving machinery where weight is a factor. Unalloyed magnesium is used only for pyrotechnics and as a deoxidizer in metallurgical operations. In powder or ribbon form it is easily ignited, burning with intense light and heat, as doubtless many a British householder, and more presently, German ditto, has cause to note. This combustability is thus utilized in flares, tracer bullets, incendiary bombs, and to some extent in preparation of magnesium compounds.

While it is officially expected that the demand for magnesium will be far less in the immediate years after the war than during the peak war period, there is little doubt expressed that the use of the metal will be substantially greater after the war than it was before. There have been improvements in production and fabrication as a result of the war, and reductions in prices of both the magnesium itself and its alloys are considered likely to stimulate their use in applications which formerly were held to be impractical.

Postwar Consumption

The principal postwar use, it is now believed, will be in aircraft and motor vehicles, but sizeable quantities are expected to be used also in portable tools and office equipment, and for alloying with aluminum. However, the maximum annual average consumption, it is now estimated, will not greatly exceed 65,000,000 pounds.

This projected consumption can be placed against the primary magnesium productive capacity of 500,000,000 pounds or more in the United States alone. Even if the consumption has been underestimated, it is pointed out, the country's output potential is far in excess of any peacetime requirements now conceived.

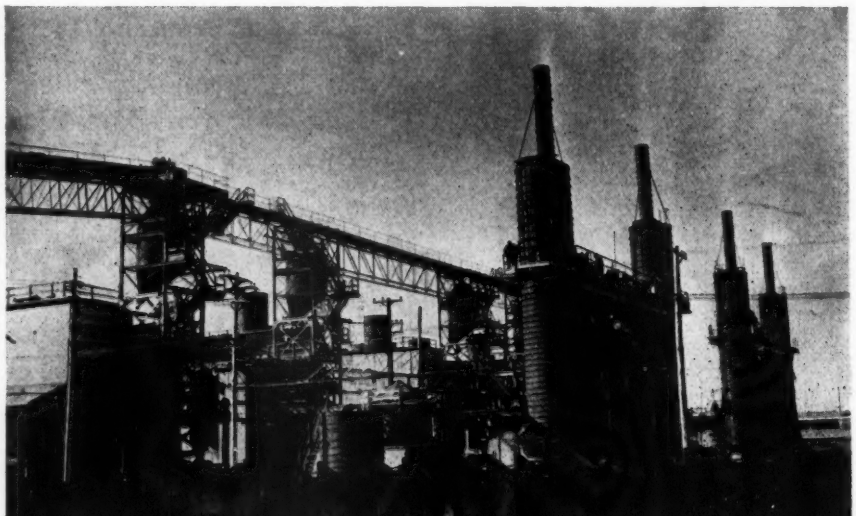
Up to the end of September, 1944, the Government, through its subsidiary Defense Plant Corporation, had expended $362,766,000 net for construction and equipment of magnesium plants, most of which opened in 1942 and 1943. Expansion also has occurred in the fabrication end of the industry, and the Government has expended some $18,000,000 for construction of a number of fabrication plants which were leased to private operators who have the first refusal on purchase.

Even as early as the first part of 1944, however, it became apparent that capacity was outrunning use, and between March and July, 1944, five Government-owned plants were closed and the output of four others was limited. A number of others have since been closed and production in all but four of the Government-owned plants ceased by the end of last year. For contrast with the estimated postwar need, the four Government owned plants and three privately owned (by the Dow and Permanente companies) have an annual capacity placed at 134,000,000 pounds.

There is thus a sizable and fairly complicated disposal problem for the Government to resolve. Concern is manifested officially that competition in the industry may be lacking after the war, and Government studies appear to be more preoccupied with the organization and control of the domestic industry than with matters of tariffs and imports.

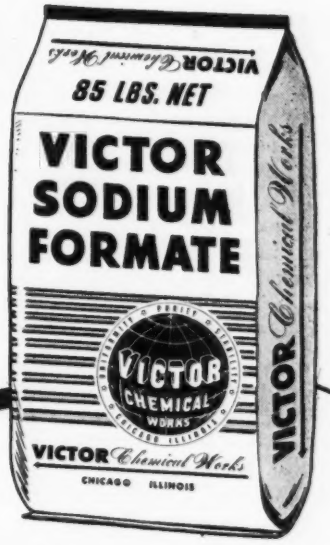
The Tariff Commission's survey is pertinent here:

"The two concerns which seem most



Hydrochloric acid absorbers at the Defense Plant Corporation's Marysville, Mich., magnesium plant. This plant was operated by the Dow Magnesium Co., but has been idle since the first of the year.

How many bags would you like shipped to you today?



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Metaphosphates . . . aluminum, ethyl.

Orthophosphates . . . ammonium, calcium, iron, magnesium, potassium, sodium.

Oxalates . . . calcium, sodium.

Phosphorus (yellow)

Ferrophosphorus

Phosphorus compounds . . . chlorides, pentoxide.

Pyrophosphates . . . calcium, sodium acid, sodium iron, tetrapotassium, tetrasodium.

Sulphates . . . magnesium, sodium aluminum.

Here's another Victor chemical available for immediate shipment. Despite continued wartime demands for all chemicals, the production of Victor Sodium Formate is sufficient today to take care of all normal requirements. A white, odorless powder, soluble in water, Victor Sodium Formate is noted for its high purity. It is packed in 85-lb. multiwall paper bags. Prompt shipments made from Chicago Heights, Illinois, plant or east coast warehouse stocks.

In the *tanning industry* Victor Sodium Formate is becoming increasingly popular for chrome tanning. Chrome tanning can be accelerated when the pH of the bath ranges between 5 and 6. Victor Sodium Formate is able to accomplish this without the chromate precipitating from the tanning liquor.

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likely to survive the great reduction in demand for magnesium which is bound to take place after the war are the Dow Chemical Company and the Permanente Metals Corporation," the Commission has reported. "The plants of both of these companies are integrated with other operations of the same or affiliated companies.

Dow's Position

"Dow owns outright plants at Midland, Mich., and Freeport, Tex., which together have a capacity of about 36,000,000 pounds. To the Freeport plant the Government has built an addition which Dow operates under lease. Dow holds a 90-day option for purchase of this plant at the close of the war at a price specified in the contract. If Dow exercises this option, its capacity will be about 54,000,000 pounds, which is five-sixths of what may be the maximum national requirements in the immediate postwar period and approximately equal to the probable requirements outside of the Pacific Coast area.

"If Dow does not purchase the addition, it will probably not be technically feasible for any other private concerns to take the addition over because of its intimate relation to the Dow-owned plant. Moreover, for the same reason, it would probably not be practicable for the Government to operate the property on its own account.

U. S. Magnesium Production Capacity

Privately Owned	*Location*	*Process**	*Annual Rated Capacity in 1,000,000 pounds*
Dow Chemical Co.	Midland, Mich.	E	18
Dow Chemical Co.	Freeport, Tex.	E	18
Permanente Metals Corp.	Permanente, Cal.	C	24
Government Owned			
Dow Chemical Co.	Freeport, Tex.	E	18
Dow Magnesium Co.	Velasco, Tex.	E	72
Dow Magnesium Co.	Marysville, Mich.	E	72
International Minerals & Chemical Co.	Austin, Tex.	E	24
Diamond Magnesium Co.	Painesville, O.	E	36
Basic Magnesium, Inc.	Las Vegas, Nev.	E	112
Mathieson Alkali Works, Inc.	Lake Charles, La.	E	54
New England Lime Co.	Canaan, Conn.	F	10
Magnesium Reduction Co.	Luckey, O.	F	10
Electro Metallurgical Co.	Spokane, Wash.	F	48
Ford Motor Co.	Dearborn, Mich.	F	40
Amco Magnesium Corp.	Wingdale, N. Y.	F	10
Permanente Metals Corp.	Manteca, Calif.	F	20
Grand total			586,000,000

* E—Electrolytic; C—Carbothermic; **F—Ferrosilicon.**

"With or without the addition to the Freeport plant," says the Tariff Commission, "Dow seems bound to be much the largest concern in the industry after the war.

"Certain factors, however, may weaken the postwar position of Dow in the industry compared with its prewar position," the Commission added in its report. "One of these is the change in the system of fabrication patents. The consent decree of April, 1942 (which stated that "no testimony having been taken each of said defendants consents to the entry of this decree without any findings of fact, upon condition that neither such consent nor this decree shall be evidence . . . that they have violated any statute of the United States, that this decree shall relate solely to future conduct") opened the 100-odd fabrication patents held by Dow royalty-free to any fabricator.

"Fabricators will therefore be more free than they formerly were to purchase primary metal from concerns other than Dow. Moreover, future technological developments may challenge the present superiority of the Dow seawater plants in cost of production. Even if Dow should for a time be the only domestic producer of magnesium east of the Pacific coast, its price policy would presumably be materially affected by the potentiality of competition from the Permanente Corporation."

Of the latter organization, the report states:

Permanente's Position

"The carbothermic magnesium plant, privately owned by the Permanente Metals Corporation, at Permanente, Calif., is one of the enterprises controlled by Henry J. Kaiser. It has a capacity of 24,000,000 pounds per year. Much of its output in the postwar period could probably be sold on the Pacific Coast, particularly to other Kaiser enterprises. In attempting to sell in the eastern and central markets, however, it would be at a disadvantage because of transportation charges."

From statements made, it is apparent that Government research is looking for the answer to whether the Government can dispose of any of its considerable number of other magnesium plants in such a way as to foster the competition it desires to see in the postwar industry. It would appear that findings so far do not support any certain conclusion on this point.

Doubt is expressed by some as to whether the private concerns which have operated plants for the Government, and still more, others that have not had this experience, will want to take a plant over from the Government.

Two factors would influence their decision to do so, it is indicated: one, a conclusion that the estimated postwar demand

(*Turn to page 876*)

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NEW PRODUCTS & PROCESSES

New Process for Manufacturing Ethyl Chloride from Waste Gases

A new process for making ethyl chloride is announced by Ethyl Corporation. A $750,000 unit employing this process is now under construction at the company's Baton Rouge, La., plant.

The process yields ethyl chloride by reacting chlorine with ethane from the waste gases of the present process at Baton Rouge. It was developed in view of the tight supplies of both alcohol and ethylene, compounds used in producing ethyl chloride through two present processes.

The principal use of ethyl chloride is in making tetraethyl lead by combining it with an alloy of lead and sodium. Tetraethyl lead comprises about two-thirds of Ethyl fluid.

Chlorine for the new process is produced by breaking salt electrically into chlorine and sodium. The sodium from this electrolysis is combined with metallic lead to form the lead-sodium alloy.

The two methods already in operation for making ethyl chloride are based (1) on the hydrochlorination of alcohol, and (2) on the hydrochlorination of ethylene. In the alcohol process, ethyl alcohol vapor and hydrochloric acid combine in the presence of a catalyst to form ethyl chloride and water.

In the ethylene process, ethylene gas is mixed with hydrogen chloride gas in the presence of a catalyst. The two gases first are passed through a reactor where hydrochlorination occurs, and later through a "flash drum" which distills off the lighter ethyl chloride fractions, leaving the heavier polymer fractions. The ethyl chloride then is purified by fractionation. The first of two plants using the ethylene process was built in 1939.

The new process was developed because of increasing wartime demands for raw materials. Before the war, Ethyl Corporation converted all the chlorine from electrolysis of salt to hydrogen chloride to make ethyl chloride, and bought additional amounts of chlorine elsewhere. Due to rising wartime demands for tetraethyl lead and for chlorine in other uses, the company overproduced sodium in 1941 to obtain more chlorine, discontinuing open market purchases of chlorine, and storing the surplus sodium.

When nationwide chlorine supplies became critically short, Ethyl Corporation expanded its plant facilities to substitute hydrochloric acid for chlorine, producing the hydrochloric acid from sulphuric acid and common salt.

Then ethyl alcohol came increasingly into demand. Construction of a second ethylene plant at Baton Rouge for the production of ethyl chloride helped to relieve the supply situation in ethyl alcohol.

As the war progressed, supplies of ethylene in the Baton Rouge area became inadequate in meeting the continuously increasing demands for ethyl chloride needed to manufacture Ethyl fluid. When the new plant is in production, Ethyl Corporation expects to meet all increased requirements for ethyl chloride for tetraethyl lead without additional drain upon available supplies of alcohol or ethylene.

Casting Sealant Resins

Monsanto Chemical Company has announced the development of a new series of Thalid compound used in the sealing of metal aircraft engine castings. The material has been developed and put into production to meet the demand of aircraft manufacturers for material to impregnate magnesium and aluminum castings for prevention of liquid and vapor leaks.

A number of compounds, both inorganic and organic, have been used in this country and abroad for sealing of porous metal castings. These exhibit certain deficiencies in sealing efficiency and stability under operating conditions. The new Thalid material is reported to overcome these difficulties and provide maximum sealing effectiveness with full adaptability to sealing castings on a production line basis.

Thalid X100 series resins, used as casting sealant, are thermosetting solutions, a mixture of base resins and styrene monomer. By varying the ratio of the two, the viscosity of the impregnating solution can be controlled to meet varying requirements arising from variation in the size of porosity in aluminum and magnesium. The solution is applied by positive pressure of vacuum-pressure impregnation.

Following impregnation the castings are put through a heating cycle which thoroughly cures the resin to a slightly rubbery condition within the pores of the metal. Parts may be subsequently machined, although the casting is usually fully machined before impregnation.

The cured sealant has excellent stability under high engine temperatures and has excellent resistance to lubricating oil, hydraulic fluids and cooling solutions.

Bulletin X100-2 which fully describes the new sealant is available from Monsanto Chemical Company, Plastics Division, Springfield, Massachusetts.

Improved Viscosity for Oils and Greases

Two new compounds, Plexols 201 and 202, have been developed by the Rohm & Haas Company, Philadelphia, for the manufacture of low-temperature oils and greases.

Since they are pure compounds rather than mixtures, their boiling ranges are narrow and their performance consistent. They are said by the company to be uniquely characterized by the fact that they possess a satisfactory viscosity in the working range of —75 to —100° F, and yet they are relatively involatile at higher temperatures. They differ in that the 202 compound is lower boiling and is fluid to a lower temperature.

They are light-yellow mobile liquids characterized by very desirable physical properties, significant among which are the high viscosity-index, low pour and high flash points.

Data sheets and experimental samples are available upon request.

Gramine Available

Synthetic gramine, 3-dimethylaminomethyl indole, in sufficient purity for pharmacologic testing, is now available in research quantities, it has been announced by the Special Chemicals Division of Winthrop Chemical Company, Inc., at Rensselaer, New York. Gramine, earlier known as donaxine, is an intermediate in the recently announced Winthrop process for synthetic *dl*-tryptophane and can, therefore, be manufactured on a reasonably large scale if a demand develops.

Gramine-Winthrop is a colorless, crystalline material with a melting point of 132-133°, with less than 1% water and negligible ash. Its purity is above 90% by spectrophotometric assay.

Dye Fastness Improved

A patent relating to the improvement of fastness to acid fading of dyed organic derivative of cellulose material has been granted to Celanese Corporation of America, 180 Madison St., New York.

According to the patent—United States Letters Patent Number 2,371,221—cellulose acetate or other organic derivative of cellulose materials dyed with water-

PENTAERYTHRITOL

FOR IMPROVED PAINTS AND VARNISHES

Are you acquainted with these HEYDEN polyhydric alcohols?

PENTEK* is a technical grade of Pentaerythritol which consists of approximately 85% mono Pentaerythritol and 15% higher polymers such as Dipentaerythritol. Another HEYDEN polyhydric alcohol of increasing interest is POLYPENTEK*, which is a mixture of higher Pentaerythritols.

Paints, Varnishes, Printing Inks and Resins containing PENTEK* or POLYPENTEK* have:

1. **Superior Alkali Resistance**
2. **Exceptional Durability**
3. **Good Water Resistance**
4. **Rapid Bodying and Fast Dry**
5. **Excellent Hardness**
6. **High Gloss and Good Color Retention**

At the present time PENTEK* and POLYPENTEK* are under allocation covered by the War Production Board Order M-300, Schedule 11. The small order exemption is 100 lbs. If you have not as yet tried PENTEK* or POLYPENTEK* in your alkyd resins, drying oils, ester gums, or modified phenolics, write today for samples and technical information.

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HEYDEN *Chemical Corporation*

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Benzaldehyde • Benzoates • Benzoic Acid • Benzyl Chloride • Bromides • Chlorinated Aromatics • Medicinal Creosotes • Formates • Formaldehyde • Formic Acid • Glycerophosphates • Medicinal Guaiacols • Hexamethylenetetramine • Piperonaldehyde • Parahydroxybenzoates • Penicillin • Pentaerythritols • Salicylates

insoluble anthraquinone dyes are treated with a solution of tannic acid and with a solution of a metal compound, such as calcium hydroxide, which reacts with the tannic acid to form a water-insoluble metal tannate.

As a result of this treatment, the fastness of the coloration to acid fumes is greatly enhanced.

Resin for Nitrocellulose Lacquers

Availability of an unallocated, long-oil type alkyd resin designed as an all-purpose grinding medium for nitrocellulose pastes, which eliminates the use of dangerous solvents and special equipment usually required, is announced by the Resinous Products & Chemical Company of Philadelphia. Known as Paraplex RG-8, the resin is low in cost, demonstrates excellent pigment-wetting properties and thus requires no equipment other than the standard roller mills employed in paint production.

In the grinding of nitrocellulose lacquers, processing difficulties have prevented many firms from grinding pastes in their own equipment. The use of highly volatile solvents normally required in synthetic resins is unsatisfactory from a standpoint of safety, and the relatively poor wetting characteristics of the usual vehicle has made pigment incorporation without solvent on the usual roller mill a difficult problem.

A solution to this problem has been found in Paraplex RG-8, a member of the Paraplex series of resins which have been used extensively in nitrocellulose lacquers because of their excellent plasticizing quality, permanence and compatibility. Paraplex RG-8 is a plasticizing type alkyd resin which in the 100 percent form has a viscosity similar to that of the high viscosity, non-drying, blown oils commonly used in lacquers.

Skin Detergent

B. Thurber Guild, M.D., president of Fairchild Brothers and Foster, subsidiary of Winthrop Chemical Company, Inc., has developed a modern synthetic skin detergent now perfected to meet the demands of specialized groups of medical men for "a safe, efficient and agreeable replacement for soap."

Known as "pHisoderm," it is produced in the form of a thick fluid cream which is hypo-allergenic containing no soap, no fatty acids, no alkali and no perfume or coloring matter. It has a pH value of 5.5, which, Dr. Guild points out, is the same as that of the average normal skin. The technical description is "an emulsion (miscible with water) of petrolatum U.S.P., lanolin cholesterols, sodium *p-ter*-octylphenoxyethoxyethoxyethylether sulfonate, and water."

Company literature states that "pHisoderm" is "active as a cleanser in either hot or cold, soft or hard water—even sea water, and produces non-alkaline suds in all these types of water. It is active under acid as well as alkaline conditions. Compared to soap, it is more rapid in action and requires less water for washing and rinsing.

Structural Plastic Laminate

A new plastic laminate known as conolite has been developed by research engineers of Consolidated Vultee Aircraft Corp.

According to the Consolidated announcement, conolite is in some respects comparable to steel because its tensile strength can be as high as 120,000 pounds per square inch although its specific gravity is only 1.64. Engineers claim it may eventually be used to fabricate entire airplane frames.

Conolite is made by impregnating fiberglass or fortisan fabric with a new type thermosetting resin, and it can be cured in numerous complex shapes with greater speed and economy than any other material currently known to exist, the company states.

Opacity of Cellulose Esters to Ultra-Violet

Celanese Corporation of America has been granted a patent relating to the use of sheets, films and the like of organic esters of cellulose which are opaque to ultra-violet light.

According to United States Patent Number 2,370,244, films, foils, sheets and other articles of cellulose acetate or other cellulose esters are rendered opaque to ultra-violet light radiations by incorporting in said materials a colorless acid salt of a quinine base.

The quinine salt is preferably one which shows an acid reaction to litmus and exhibits a blue fluorescence and may be incorporated in the solution from which transparent films or articles are formed. The sheets and films of this invention are useful as photographic filters, coverings for food, for laminated glass manufacture, welders' goggles and the like.

Solvent-Resistant Coating

Thomas W. Dunn Company, 546 Greenwich St., New York, has announced a film coating, manufactured from agricultural raw materials, which is highly resistant to gasoline and other organic solvents.

The compound will become an inseparable part of any porous material to which it is applied. It will also adhere to anodized aluminum, but it will not bond itself to untreated metal. Used for the coating of paper and similar materials, it provides an expendable container for oils and solvents. In the course of resistance tests, it has successfully withstood the penetration of gasoline for a period of three years.

Its use as a coating for the protection of metal parts from weathering has also been suggested.

New Adhesive

A versatile, general purpose adhesive, Syn-Tex 2113, for heat sealing and wet stick operations has been announced by Dennis Chemical Company, 2701 Papin, St. Louis 3, Mo.

It is effective on materials such as wood, fabric, leather, paper, cardboard, or other similar materials; also on painted, lacquered or coated surfaces.

It provides extremely strong bond and dries to a thoroughly flexible film. It may be used in concentrated form or diluted for use with gumming machine, spreader, spray gun or flow method. As another method of application, the adhesive is applied to both surfaces and allowed to dry. When placed together under heat, the softened film firmly unites the two materials.

Syn-Tex 2113 is a free flowing white emulsion of modified synthetic resin bases.

Cupriferous Cement Repels Roaches

Investigational findings reported by Mellon Institute, Pittsburgh, Pa., demonstrate the repellency of the floor surfacing material "Hubbellite," a cupriferous cement, to German, American, and Oriental roaches. These results are of significance to food manufacturers, our armed forces, restaurants, hotels, institutions, and also home managers.

Glass aquaria having a two-gallon capacity served as test chambers. In preliminary tests one-half of each was floored with gray-colored Hubbellite, the other with Portland cement. Food and water were provided in each half; the roaches introduced and the aquaria placed in absolute darkness. Observations and counts of distribution were made at 24-hour intervals. Several aquaria serving as controls were entirely floored either with Portland cement or Hubbellite. The data from preliminary tests clearly indicate the repellency of Hubbellite to all three species of roaches, with a more marked efficiency exhibited against the German roach.

Toluene From Other Aromatics

A recent patent from the Sowa Chemical Co., 305 E. 46th St., New York, describes the conversion of a mixture of benzene and polymethylated benzenes or phenols to toluene. The mixture of benzene, toluene, xylenes, and higher aromatic hydrocarbons is fractionated in order to obtain pure toluene.

The benzene is obtained from light coal tar oil, the proper fraction being mixed

You can use Versatile Sulfuryl Chloride in many Different Reactions

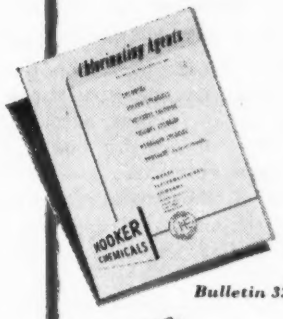
Sulfuryl Chloride is a versatile reagent valuable in the synthesis of organic chemicals. Reactions are simple, easily controlled, and yield is high.

Chlorination of Aromatics and Aliphatics

In the chlorination of aliphatic and aromatic compounds, Sulfuryl Chloride is firmly established. Among these reactions are those with sodium salts of organic acids to produce organic acid chlorides. It is used to chlorinate phenols and its derivatives, and while the products obtained are in general the same as with gaseous chlorine, with Sulfuryl Chloride the reaction is less vigorous and more easily controlled. It also chlorinates aromatic amines readily without the aid of catalysts.

With the use of aluminum chloride (also produced at Hooker) as catalyst, benzene and toluene may be chlorinated in stages. With naphthalene, sulfuryl chloride demonstrates its sensitivity to altering reaction conditions—as chlorination can be made to give 1-chloronaphthalene, 1, 4-dichloronaphthalene or 1, 2, 3, 4-tetrachloro-1, 2, 3, 4-tetrahydro naphthalene.

It has recently been discovered that chlorination of aliphatic hydrocarbons and their derivatives with sulfuryl chloride in the presence of small amounts of peroxide takes place at moderate temperatures. Generally speaking, the products of chlorinating various paraffin hydrocarbons and their halogen derivatives parallel those produced by the photo chemical reaction with gaseous chlorine.



Bulletin 328-A

Bulletin 330

Sulfonation of Aromatics and Aliphatics

But this versatile chemical is not satisfied with serving only in chlorinating reactions. Of almost equal importance is its use in sulfonation of both aromatic and aliphatic compounds. Recent reports indicate that by the addition of small quantities of aluminum chloride to a cooled reaction mixture of sulfuryl chloride and aromatic hydrocarbons, such as benzene, toluene, xylene and mesitylene, sulfonyl chloride derivatives could be obtained.

In the sulfonation of aliphatic compounds, it has been found that in the presence of light and a catalyst such as pyridine, sulfuryl chloride and paraffin hydrocarbons undergo a rapid, vigorous reaction with the formation of alkyl sulfonyl chlorides, with yields in some cases as high as 70%. Among the hydrocarbons thus sulfonated are cyclohexane, n-butane, ethylbenzene, and *tert*-butylbenzene.

Acylation

In many reactions Sulfuryl Chloride reacts as an acid chloride of sulfuric acid to form alkyl chlorsulfonates with many aliphatic alcohols. Aliphatic amines and aromatic amines may also be reacted with Sulfuryl Chloride to produce a number of interesting acylated products. Sulfuryl Chloride is capable of many other interesting reactions not described herein.

Literature on Sulfuryl Chloride Available

Hooker Bulletin 328A on chlorinating agents gives more complete information on sulfuryl chloride and other Hooker chlorinating agents. The Hooker Electrochemical Co. also has available Bulletin 330, reprint of an article "Sulfuryl Chloride in Organic Chemistry," which recently appeared in Industrial and Engineering Chemistry. Both are available when requested on your letterhead.

HOOKER ELECTROCHEMICAL COMPANY

3 Forty-Seventh St., Niagara Falls, N. Y.

New York, N. Y. • Tacoma, Wash.
Wilmington, Calif.

HOOKER CHEMICALS

CAUSTIC SODA **MURIATIC ACID**

CHLORINE **PARADICHLORBENZENE**

with polymethylated compounds and subjected under heat and pressure to the action of a catalyst such as aluminum chloride or boron fluoride.

New Insecticide Material

Benzene hexachloride, $C_6H_6Cl_6$, has been found to be an effective insecticide by British chemists. The compound is quite simply obtained by chlorinating benzene in sunlight and crystallizing the substance from hot benzene.

Early tests were encouraging, but the results were inconsistent. It was discovered that the anomaly was due to a difference in the proportions of the four possible stereoisomers in the various samples. The γ-isomer was isolated and found to be responsible for almost all of the insecticidal activity. While the original compound was called 666, the active isomer was given the special name of "Gammexane." It can be separated from the other isomers by fractional crystallization from methanol and chloroform.

Gammexane is a very stable compound, and one method of use has been to volatilize it from hot plates. It can also be incorporated into solutions, emulsions, or solid insecticidal compositions.

Early tests indicate that it is five times as effective as DDT.

Furane Resin Adhesives

The first commercial development solely from furane derivatives is the unique claim of the Furane Plastics and Chemicals Co., 5233 W. San Fernando Rd., Los Angeles 26, Calif., for its new product, Resin X.

This resin adhesive is claimed to cure at room temperature, requiring moderate or no contact pressure, and to be completely resistant to water, alcohol, or gasoline. It develops high bonding strengths and is stable in storage.

Synthetic Gum Benzoin

Bendix Chemical Corporation, 420 Lexington Ave., New York City, reports that it has succeeded in producing synthetic gum benzoin on a commercial scale.

This new product, having properties quite similar to the natural styrax benzoin of the Siam type, has been carefully examined and adopted by consumers applying this basic material in their operations.

This product, having a sweet-balsamic odor, a sweet taste, an amber color, not containing any impurities, is completely soluble in alcohol or in equal parts of methyl carbitol, thus, being even superior to the natural gum benzoin relative to the solubility. As stated by the manufacturer, the fixative properties and constituents closely correspond to those of the natural gum benzoin.

New Cleanser

Standard Scientific Supply Corporation has just released the results of tests as to the efficiency and labor-saving qualities of its new wetting agent, Alconox.

The tests showed that this new detergent leaves no surface film or streaks, and for all practical purposes requires no time-consuming toweling or polishing. Simple rinsing leaves the surface sparkling clean.

Alconox was tested in water of varying degrees of hardness and even in strong acid solutions, with equally satisfactory results.

Drying Oil From Soybeans

An announcement from the research laboratories of Spencer Kellogg and Sons, Inc., describes the development of a new drying oil manufactured from soybean oil and given the brand name "Drisoy."

Drisoy is furnished by Spencer Kellogg and Sons, Inc., in two viscosity types: "Drisoy-A" of F-G viscosity and "Drisoy-B" of D-E viscosity. "Drisoy-A" is recommended generally for the same types of paints and varnishes in which linseed oil is used. "Drisoy-B," having lower viscosity, is particularly adapted to the making of alkyds.

The development of Drisoy has already reached the production stage and experimentation with standard varnish formulations has already been conducted. Experimental samples are available upon request.

Aromatic Chemicals
IN INDUSTRY

THE field of Aromatic Chemicals in Industry has widened considerably in recent years.

NO longer is the use of Perfumes restricted to the Soap, Cosmetic and Perfume Manufacturer.

PERFUMES are now widely used by such diverse manufacturers as: the rubber industry, the paper industry, the textile industry and many others.

FURTHER research is constantly being made both by us and by manufacturers of many diverse products.

PERHAPS we can be of service to you.

Among our many products the following are proving useful in numerous industries:

Butyl Phenyl Acetate
Lignin Vanillin
Veratraldehyde
Ethaldehyde
Cinnamic Alcohol
Ionone Ketone
Ionone Methyl
Acetophenone
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Phenyl Acet Aldehyde Di Methyl Acetal
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Aromatics Division
GENERAL DRUG COMPANY
125 BARCLAY STREET NEW YORK 7, N. Y.
9 S. Clinton Street, Chicago 6 1019 Elliott Street, W., Windsor, Ont.

THE field of application for purified petroleum hydrocarbon oils, sometimes referred to as white mineral oils, is widening constantly. Exploration of their possibilities is often followed by their adaptation to meet specific requirements arising in the manufacture of new products. Actually, these oils have been for some time replacing ordinary mineral oils or oils of other origin because of certain unusual characteristics possessed by purified hydrocarbon oils.

The recognition of these characteristics of purified hydrocarbon oils — now commercially available — is very often the first link in a chain of events leading to their ultimate adoption for new uses. Among their characteristics are those listed at the right.

These and other characteristics suggest a wide variety of specific applications in many fields and may well hold the solution to one or more problems of your own.

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* This is the first in a series of bulletins focusing industry's attention on the possibilities of purified petroleum hydrocarbon oils. The next will appear in an early issue of this publication.

PARTIAL LIST OF CHARACTERISTICS OF SONNEBORN PURIFIED HYDROCARBON OILS

- ☐ No unsaturated hydrocarbons
- ☐ Substantial freedom from aromatic hydrocarbons
- ☐ Composition, predominantly, of saturated paraffins and napthenes
- ☐ Free miscibility with all petroleum products, many essential oils, and most animal and vegetable fats, oils and waxes
- ☐ Freedom from color, odor and taste
- ☐ Non-drying
- ☐ Absence of gumminess or stickiness
- ☐ Non-supportive to pathogenic bacterial and mold growth
- ☐ No carbonizable substances
- ☐ Normally non-corrosive and non-sludging

RANGE OF PHYSICAL CHARACTERISTICS

Specific Gravity: 0.775 to 0.895 @ 60°F
Saybolt Viscosity: 30 to 345 @ 100°F.
Distillation Range: 370 to 800°F.
Flash Point: 170 to 420°F.
Fire Point: 190 to 480°F.
Pour Test: +40°F. to −35°F.
Aniline Point: 175 to 230°F.
Refractive Index @ 20°C: 1.43 to 1.48
Dielectric Strength: Above 29 K. V.
Sligh Oxidation Number: 0.0 to 0.9
Copper Stability Test: Not less than 20
Molecular Weight: 175 to 400
Conradson Carbon Test: Below 0.005%
Unsulphonatable Residue: Above 97.5%

Please direct inquiries on specific problems to Department of Industrial Research

L. SONNEBORN SONS, INC.

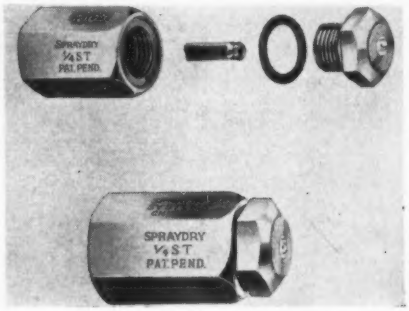
Refiners of Petroleum

88 Lexington Avenue, New York 16, N. Y.

NEW EQUIPMENT

Spray Nozzle QC 549

An outstanding feature of the ¼ST spray drying nozzle made by Spraying Systems Company is its ability to perform to predetermined specifications and from the wide variety of sizes in which these nozzles are available it is possible



to select one with exactly the required capacity. Furthermore, each particular nozzle is designed to provide the finest atomization possible at the given pressure.

These Spraying Systems nozzles use renewable cores and orifice inserts and all component parts are accurately machined. Orifice inserts are heat treated and lapped and are available in either hardened steel or tungsten carbide with flat or cup tops.

The spray pattern is a hollow cone with uniform distribution and spray angles predetermined for each nozzle size. The type ¼ST shown has a ¼" female threaded pipe connection and its overall dimensions are 13/16" hex. x 1 9/16" long.

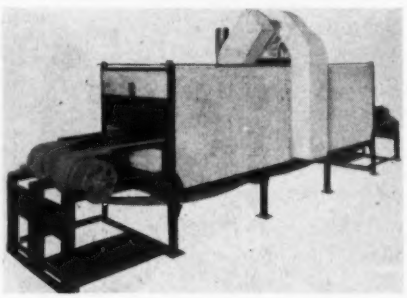
Double Belt Conveyor Oven QC 550

A new continuous heat processing oven has been designed and built by Gehnrich Oven Division of W. S. Rockwell Company, which offers many combinations of drying, baking or heat treatment operations with uniform heating and savings in handling, labor, time and plant space.

It is designed specifically for preheating and baking electronic devices, i.e., zinc die castings assembled with the necessary paper, copper, plastic discs and vacuum tubes; nevertheless by the very nature of its handling and heating, this oven presents possibilities for applications in many other fields.

The oven housing is built of Gehnrich patented insulated dual panel assembly with no metal or metal joints, minimizing heat losses. Electric heating elements are mounted in the oven just below the roof, and a large motor-driven multiblade fan is mounted on the roof. Heat from the elements is drawn through the fan into a vertical duct to the bottom of the oven and distributed evenly by means of louvres in the oven floor upward through the work moving on the conveyor belts and up past the electric heaters. If gas or steam heating is desired, the heater and fan unit can be set on the roof with the same means for heat distribution and recirculation.

Each wire-mesh belt conveyor, running between angle guides, is provided with a speed reducer, roller chain and a variable speed pulley drive. One drive mechanism

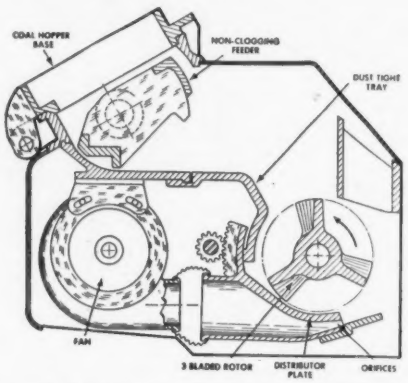


(not shown) is mounted on the bottom base at each end of the oven. This permits operation of the conveyors at any desired speed in the same or opposite directions. Thus individual pieces of work set directly on the belt, or baskets or trays of bulk materials can be fed simultaneously from both ends of the oven, or in two rows from one end.

While the overall size of this oven is only 15' long x 3' wide, the design is flexible enough to permit any required dimensions and variations of construction details to meet specific production, time and temperature cycles. Suitable ventilation for purging the oven of volatiles, and interlocked automatic protective controls of temperature, heat source and fan assure operating safety and uniform processing.

Spreader Type Stoker QC 551

The new Johnston and Jennings Spreader Type Stoker features mechanical-pneumatic coal distribution and offers



many distinctive features to increase the efficiency of combustion and assure long, trouble-free operation.

One of these features—see the accompanying diagram—is the sturdy, rugged, non-clogging and dust-tight coal feeder. It is adjustable for various operating conditions and is said to prevent any spillage of fines along the front of the stoker.

The 3-bladed rotor receives the coal from the feeder tray and discharges it into the furnace from the end of the distributor plate. A small high velocity fan mounted in back of the rotor, and discharging through orifices under the distributor plate, catches the fines for distribution to all parts of the furnace, overcoming any tendency of the fines to drool down on to the furnace hearth, preventing any segregation of fines on the front grates, and lumping on the rear grates. This produces an even homogeneous fuel bed, and ideal burning conditions.

Air cooling of all exposed parts of the stoker is accomplished partly by the air entering the furnace through the orifices under the distributor plate, and partly by secondary air from the windbox introduced via side tuyeres in the front arch, avoiding any need for water cooling.

The stoker unit is mounted on the front of the furnace with four hinge pins, 2 on each side, making it an easy matter to remove the 2 pins on one side, disconnect the drive belt, and swing the entire stoker to an angle of 90° with the front

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 522 Fifth Ave., New York 18, N. Y. (5-5)

Please send me more detailed information on the following new equipment.

QC 549	QC 552	QC 554	QC 556	QC 558
QC 550	QC 553	QC 555	QC 557	QC 559
QC 551				

Name ..... **(Position)** .....

Company .....

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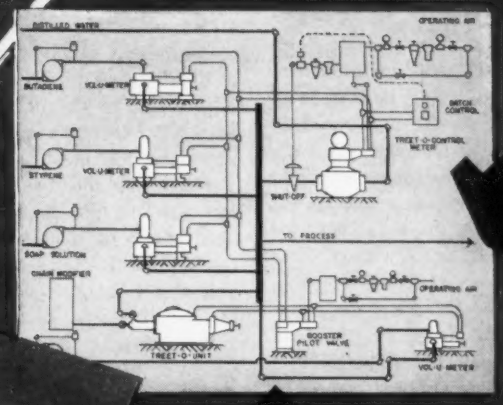
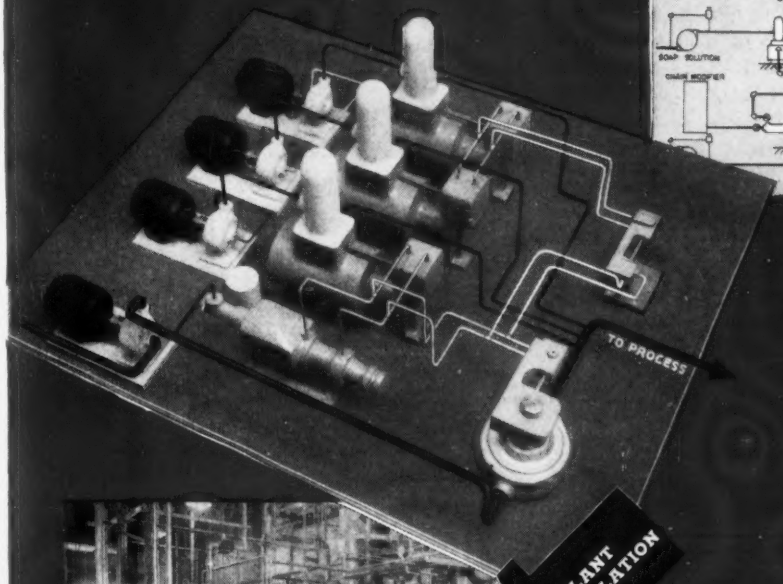
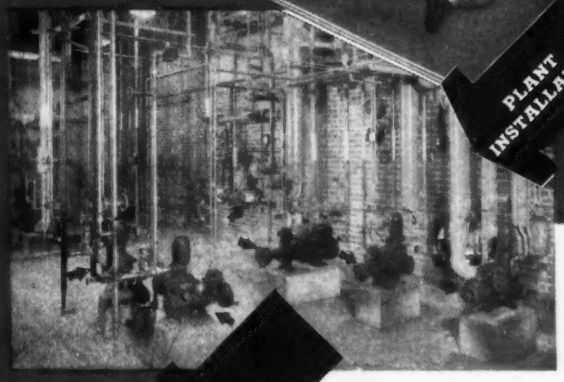
A Working PRINCIPLE

Continuous proportional blending of multiple fluids under line pressure





FOR Continuous Blending OF MULTIPLE FLUIDS



Continuous AUTOMATIC BLENDING WILL WORK FOR *You*

For manufacturers who plan to beat postwar competition, the economy of operation and uniformity of end product produced by "streamlining" blending processes cannot be overlooked. The trend is already under way and many plants today are converting from batch to continuous methods, relieving the operator from an excessive burden of responsibility. By using a tried and proven %Proportioneers% system, you eliminate guesswork, assure accurate blending, safeguard your investment in raw materials, maintain accurate control over your end product —and reduce reruns and losses due to improper compounding.

Ask for Bulletin 1700

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WRITE TO % PROPORTIONEERS, INC.%, 10 CODDING ST., PROVIDENCE 1, RHODE ISLAND

of the furnace for easy inspection and repair.

The stokers are furnished in four standard sizes; with 16", 20", 24" and 32" long rotors and can be installed singly or in multiple units for boilers ranging from 75 horsepower upward.

Face Shields QC 552

Four new face shields to provide light-duty protection on such operations as metal sawing, acid handling, buffing, sanding and light grinding are announced by the American Optical Company, in addition to three types of button-on windows for the shields: clear cellulose acetate for general purposes; 24 mesh screen for heat protection; and fibre with a filter glass window for welding and scarfing.

The new face shields are light, comfortable, and sturdily made to withstand hard use. They may be worn without discomfort by workers who wear prescription glasses and all the parts are easily interchangeable.

The new AO F-100 face shield has an adjustable elastic headband which may be worn low on the head for additional comfort. Genuine leather sweatbands, like the windows, button on and are easily removed. A fibre headpiece holds the device comfortably and firmly on the head. The shield may be instantly thrown up when not in use and is held securely in position by friction joints. Removal of the pivotal nut, spider and washer permits instant interchanging of parts. The F-200 shield is the same as the F-100, but in addition it is fitted with a standard spark deflector (or forehead guard) for extra protection.

The F-300 shield is identical to the F-200 with the exception of the back headband which is of fibre construction, styled to fit the lower head snugly and comfortably. The long band slides within a fibre sleeve in back, permitting easy adjustment to varying head sizes and is adjusted by a knurled nut turning on a right and left hand threaded stud.

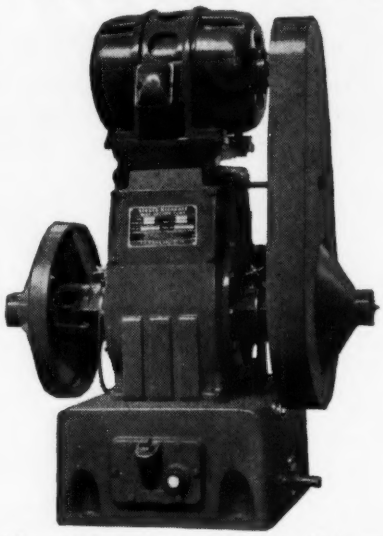
The F-400 shield is designed primarily for working in confined places where head bumps or lacerations may occur and has all the features of the F-300 shield plus a full spark or head deflector. This semi-skull guard protects the forehead and upper scalp from flying chips, small cuts and bumps.

High Vacuum Pump QC 553

A new high vacuum pump, designed to produce and maintain vacuum as low as five microns absolute pressure in continuous service, is being marketed by the F. J. Stokes Machine Company. The pump is rated at 100 cu. ft. displacement at 350 r.p.m.

Only four internal moving parts are employed: a shaft with keyed-on eccentric, a rotating one-piece piston and slide, and the hinge bars. This design eliminates dead space or clearance, permitting the discharge of air at the end of each stroke to be complete with no re-expansion to impair pump efficiency.

The only valve, on the discharge side of the pump, is very sensitive to pressure



differentials and is made to discharge, without injury, sudden slugs of water or other liquids which may be sucked into the pump. The valve seat is of stainless steel, ground to an accurate surface, readily accessible and replaceable.

The pump is direct motor driven with V-belt drive and motor mounted on an adjustable hinged base and floor space requirements are held to a minimum by using a top-mounted motor. The pulley is carefully balanced to act as a flywheel and assure smooth operation; oil baffles being built into base to remove entrained oil from the exhaust.

Portable Pump QC 554

To meet the requirements of manufacturing plants and other applications where temporary pumping facilities are needed,

and for use by the Armed Forces, the engineers of the Blackmer Pump Company have developed a self-contained gasoline-powered rotary pumping unit.

The unit illustrated consists of a 90 GPM bronze fitted standard Blackmer pump with built-in chatter proof relief

SUPPLIERS SINCE 1838

COCOANUT OIL
Castor Oil
Corn Oil
Cottonseed Oil
Olive Oil and Foots
Peanut Oil
Rapeseed Oil
Sesame Oil
Sunflowerseed Oil
Lard Oil
Neatsfoot Oil
Tallow and Grease
Lanolin and Wool Fat

FATTY ACIDS
Red Oil
Special White Oleine
Stearic Acid
Rufat
Cocoanut F. A.
Corn F. A.
Cottonseed F. A.
Linseed F. A.
Peanut F. A.
Soya F. A.
Tallow F. A.

White Mineral Oil - Petrolatum - Superfatting Agent

VODOL A maize phosphatide which lowers surface and interface tension of oils and fats, stabilizes and prevents reversion, increases penetration and spread.

Soda Ash
Caustic Soda
Modified Soda
Sodium Metasilicate

Trisodium Phosphate
Disodium Phosphate
Monosodium Phosphate
Tetrasodium Pyro Phosphate

THE LAMEPONS unique surface active agents; prolific foam; high detergency and emulsifying powers; suitable for cosmetic and industrial use.

QUADRAFOS a stable polyphosphate for water conditioning and mild but effective detergency.

Starch and Dextrine

WELCH, HOLME & CLARK CO., INC.
563 GREENWICH STREET, NEW YORK 14, N. Y.

BURNING TIME LESS THAN 20 SECONDS— FOR THE TOUGHEST FIRES

• Yes, Kidde built-in systems choke off flammable liquid fires (Class B) —or electrical equipment fires (Class C)—in *less than twenty seconds.* When *automatic* systems are used, fires are often suffocated before nearby workers realize a blaze has even *started!*

Ordinary water-type extinguishers cannot stop these tough fires. But they can be quickly smothered under clouds of swift carbon dioxide gas—dry, inert, ordorless and non-toxic. And that's the Kidde method! It leaves no after-fire mess, no contamination of mixes or fluids, no damage to electrical equipment. That's why the Kidde system is recognized as one of the speediest, cleanest, safest means of fire extinguishing in use today.

Check the accompanying list of typical industrial fire hazard areas—for safety's sake. If there is one of these danger spots in your plant, call in a Kidde representative—he'll be glad to discuss your fire protection problems.

Kidde Kills Tough Fires

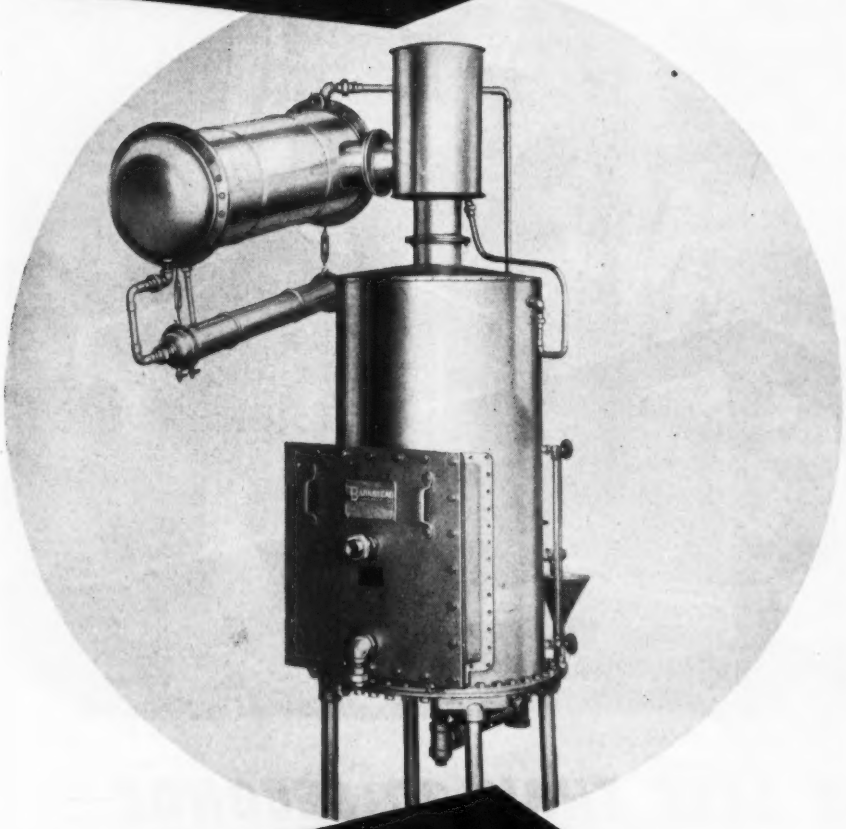
- PROCESS ROOMS
- MIXING TANKS
- AGITATORS
- PUMP ROOMS
- STORAGE AREAS
- DRUM-FILLING ROOMS
- MOTORS
- TRANSFORMERS
- ELECTRICAL CONTROL PANELS

K Kidde

The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

Walter Kidde & Company, Inc. • 140 Cedar Street • New York 6, N. Y.

PURE WATER
the SURE way



with a
BARNSTEAD Water Still

There's never any uncertainty about the Purity of your distilled water when you have a Barnstead Water Still. It's the surest way there is to get pure water . . . because a Barnstead removes all types of impurities . . . organic, inorganic (including silica), bacterial, volatile, and pyrogenic. Many Barnstead Stills have been in service over 20 years and are producing as pure a distillate as when they were installed.

There are other reasons for selecting a Barnstead Still such as economy, automatic operation, ease of cleaning, to name a few. Put them all together and they spell years of trouble-free service for any business. Models up to 1,000 gallons per hour . . . capacities for all operating conditions and needs.

TRADE MARK REG U.S. PAT OFF.
Barnstead
STILL & STERILIZER CO. Inc.
49 LANESVILLE TERRACE, BOSTON 31, MASS.

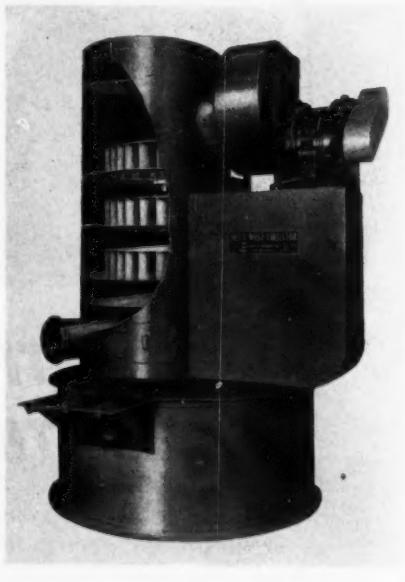
valve, oil immersed drive and 2 HP gasoline engine, all mounted on a fabricated steel base which is fitted with telescopic handles for convenience in moving. The complete unit weighs 330 pounds and is easily carried by two men.

Wet Method Dust Collector QC 555

Isolated dust-creating operations, which cannot conveniently be served by a central dust collecting system, can take a serious toll in lowered working efficiency, undue wear on motors and operating equipment, contaminated product, and reduced output. To meet such requirements, the self-contained dust collecting unit, Schneible Type "EC" Multi-Wash Collector, has been developed.

The equipment consists of a three and one-half impingement stage multi-wash dust collector, a suction fan, a sludge settling tank, a recirculating pump, a sludge settling tank and an after-filter. The unit operates with the same efficiency as larger multi-wash equipments. "EC" units are available in capacities of from 400 to 5,000 cubic feet of treated air per minute.

This collector is designed to function

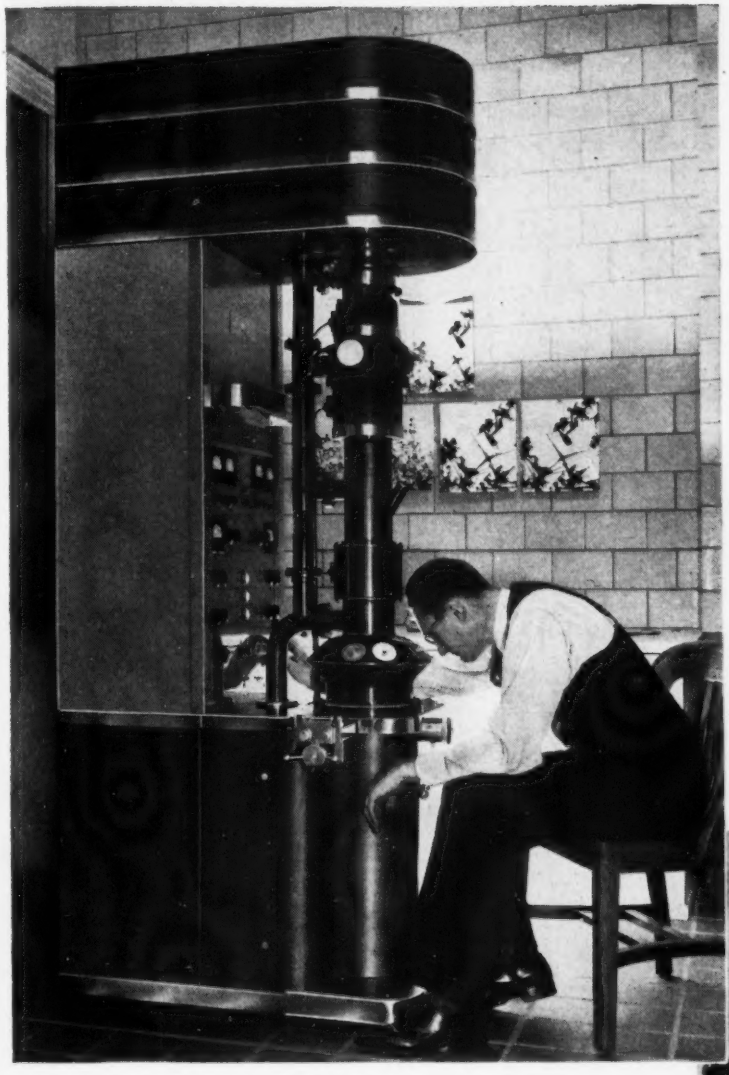


with but little attention and with a minimum of maintenance. There are no bags, screens or filters to require cleaning or replacement. There are no parts to rapidly wear, clog, burn or become inoperative. The collected matter, as sludge, is disposed of more easily than an accumulation of dust.

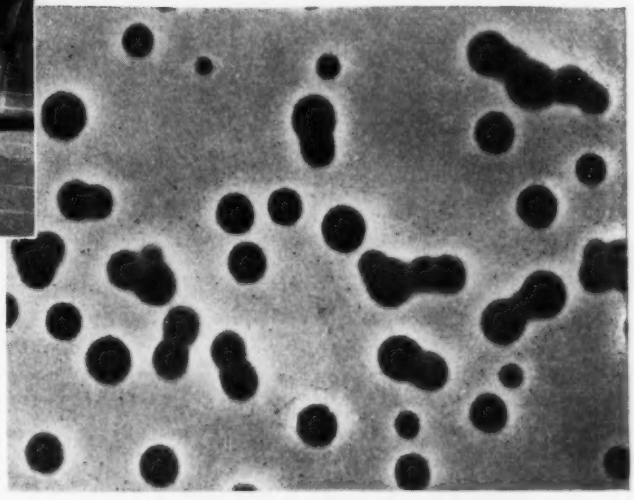
Tank Heater QC 556

An immersion type steam tank heater has been introduced by the Brown Fintube Company and is used with any material for reduction of viscosity by heating. The heaters speed up the emptying of tank cars and permit many viscous materials to be handled in cars not fitted with steam coils.

As fabricated, the heater consists of a



Goodyear Tire and Rubber Company Tells How the RCA Electron Microscope Helps Manufacturers



Micrograph made with RCA Electron Microscope showing Synthetic Rubber Latex Particles x 25,000

THE RCA Electron Microscope showed Goodyear scientists that particles of natural rubber latex range in size from as little as 4 millionths of an inch to as much as 160 millionths; and that the size of synthetic latex particles ranges only from 0.8 to 7.2 millionths of an inch. This information indicated to Goodyear research men answers to several questions of great importance to rubber manufacturers, namely:

1. Why has synthetic latex so much greater mechanical stability?
2. Why is it impossible to concentrate synthetic latex by centrifuging, as is done with natural latex?
3. Why has synthetic latex greater viscosity than that of natural latex having the same content of solids?
4. Why does synthetic latex impregnate fabrics more readily than does natural latex?

Here is an excellent example of the practical value of the RCA Electron Microscope—how it helps manufacturers—how it can be used, not only in research but in checking production for particle size, structure, distribution, etc., for better control of product quality.

RCA Electron-Microscope engineers will gladly advise any manufacturer of the probability that an instrument of this type will prove profitable in his work. Please address inquiries to Electron Microscope Section, Radio Corporation of America, Department 116R, Camden, New Jersey.

BUY MORE WAR BONDS

RADIO CORPORATION OF AMERICA

RCA VICTOR DIVISION • CAMDEN, N. J.

In Canada, RCA VICTOR COMPANY LIMITED, Montreal

number of lengths of Brown Fintubes connected in series, and inlet and outlet steam lines. The heaters have low center of gravity and can be handled safely by one man. Cross handles aid in positioning the heater over the discharge outlet in the car, in blocking the heater at various depths, and removing the unit after the car is empty. They are furnished in two sizes—the No. 642 for use with tank cars and the No. 442 for use with tank trucks.

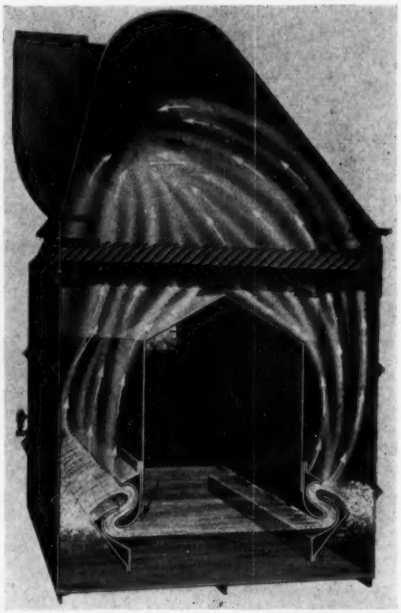
New Apron QC 557

The United States Safety Service Company has announced a new design in neoprene aprons with a snap-on chrome leather front patch. This new apron is designed for use where heavy abrasive action is a factor in operations using cutting oils. Tests under working operations over several months have shown a reduction in the number of aprons used to as little as 5% of former requirements.

Dust Collector QC 558

The latest addition to the Roto-Clone series, the Type N, of dust collecting equipment made by the American Air Filter Company, Inc., is based on the principle of hydrostatic precipitation. Compact, easy to install, and requiring a minimum of space, the absence of moving parts makes it ideal for safe collection of flammable and explosive dusts, the collection of linty and adhesive dusts from buffing operations, and the treatment of corrosive gases.

The air is cleaned by a combination of centrifugal force and intimate intermixing of water and dust laden air by



forcing it through the sinuous passage of a stationary impeller. This induces a heavy sheet of water to move along the surface of the impeller blades creating a water curtain in the form of a reverse "S" through which the air must penetrate and the high collection efficiency is the result of the impingement of the dust on water due to the centrifugal action in the impeller and the scrubbing action of the water curtain.

The Type "N" Roto-Clone is manufactured in three classes and thirteen sizes for the exhaust of air columns from 1,000 to 25,000 cfm.

Rechargeable Flashlight Battery QC 559

Forty percent greater capacity and higher sustained bright light is claimed for a new model rechargeable flashlight battery announced by the Ideal Commutator Dresser Co.

The present battery is the result of several years of intensive research stimulated by the success obtained from previous models now in service, which have played an important part during the war due to the scarcity of dry cells. A definite place has been secured wherever requirements call for regular flashlight use.

The Ideal battery may be charged from any AC electrical outlet by means of a rectifier type charger or from the DC ignition system of automobile, truck or bus. This rechargeable feature is said to provide greater economy and brighter, sustained light where flashlights are used regularly.

ARMY AIR FORCE "ALL-WEATHER" RESEARCH CONDUCTED WITH TYPE K POTENTIOMETER

AAF researchers, at Wright Field, Ohio, simulate weather from Arctic cold to desert sandstorms, with a full accompaniment of sun, wind and rains — to determine the effects of such conditions on soldiers.

Helping with this vital experimentation is the L&N Type K-2 Potentiometer shown in use above; it is measuring to a small fraction of a degree, atmospheric temperatures and body and skin temperatures of the soldier in the "all-weather room" beyond the window. Type K Potentiometer is especially adapted to many such laboratory measurements demanding excellent precision and easy, rapid operation. Catalog E-50B(3) describes these and other features.

Jrl Ad E-50B-420(1b)

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LEEDS & NORTHRUP COMPANY, 4982 STENTON AVE., PHILA., PA.

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Properly Engineered Materials PLUS Skilled Application "Know-how"

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the chemically inert plastic

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THAT, in a nutshell, is the reason why more and more engineers are specifying "tanks to be lined by U. S. Stoneware."

They know that from the wide range of lining materials manufactured by U. S. Stoneware that we can suggest, without prejudice, the lining material best suited for a given job. They know that the skill and knowledge acquired through 80 years of leadership in fabricating corrosion-resistant materials and equipment is assurance of an application technique, an engineering "know-how" that means a better tank lining job no matter what material is used.

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AKRON, OHIO

PACKAGING & SHIPPING

by T. PAT CALLAHAN

Shortage of Steel Drums And Shipping Pails

On March 26 the War Production Board called attention to the reduction of allotment of sheet steel to be used in the fabrication of steel drums and shipping pails. This reduction, coupled with increasing military requirements for steel packaging, will be reflected in a reduced supply of drums and pails for industrial users during the next few months.

T. Pat Callahan

We quote the WPB release of March 26:

"Packers were urged by the container industry and WPB to expand their efforts to reuse drums and pails. Consumers were requested to assist in alleviating the shortage by returning empty steel containers promptly to their suppliers. When return to the original packer is impractical, containers should be made available to a used-drum dealer or reconditioner or another user in order that they may be returned to essential trade channels without delay.

"In response to a request by Government officials to increase small container production to meet present large backlogs of orders, several industry committee members voiced the opinion that they could improve their output if sufficient boxcars were made available. A few shut-downs were reported as a result of manufacturers' inability to obtain boxcars.

"The committee recommended that the industry be given sufficient steel for a 60-day inventory to facilitate the production of the various sizes and types of steel containers required for military and industrial use. Experience has shown that any reduction below the 60-day inventory level lowers the efficiency of plant operations and results in slowing down of production, committee members said."

Limitations on Tinplate

Conservation Order M-81 was amended on April 6. The amendment continues limitations upon cans made of tinplate and terneplate. With minor exceptions, however, cans not made of tinplate or terneplate but made only of blackplate are no longer restricted by this order.

There is attached to this order Schedule A showing the only products which may be packed in tin or terneplate cans, except that under certain limitations unlisted non-food products may be packed in cans where no terneplate is used and the soldered parts are .025 or less electrolytic tinplate.

As this order has been completely revised, we suggest to anyone who has use for containers which formerly came under this order or which are now included in the order to read the order in its entirety, as the changes incorporated in this order by the amendment may have a very definite bearing on the future packaging in what is commonly referred to as "cans" by the chemical industry.

Procedure Outlined for Metal Strapping Use

Preference Rating Order P-152, effective April 6, assigns the ratings which may be extended to obtain metal strapping. Under this order strapping which is used for carloading, skidloading, baling and bundling may be obtained by extending an AA-1 rating. If the rating of AA-1 is used, the purchase order must be certified as follows:

"All of the strapping covered by this purchase order will be used for carloading, skidloading, baling or bundling, as defined in Order P-152.

"The undersigned purchaser certifies, subject to the penalties of section 35(A) of the U. S. Criminal Code, to the seller and to the War Production Board that he is entitled to apply or extend the preference rating set forth on this order and that such application or extension is in accordance with Priorities Regulation 3, and with the provisions of Order P-152."

If metal strapping is needed for container reinforcement, which means the external strapping of single containers or merchandise to reinforce and protect the package and its contents against damage in transit, or to permit the use of less wood or paperboard in the component parts of boxes, crates and cartons, the same rating may be used which was used to obtain the containers which are to be strapped.

Strapping for the reinforcement of edging may be obtained by using an AA-5 rating or a special rating which would be assigned by the War Production Board. If strapping is purchased for container reinforcement or reinforcement of edging, the following certification must appear on the purchase order:

"The undersigned purchaser certifies, subject to the penalties of section 35(A) of the U. S. Criminal Code, to the seller and to the War Production Board that he is entitled to apply or extend the preference rating set forth on this order and that such application or extension is in accordance with Priorities Regulation 3 and with the provisions of Order P-152."

The amount of steel strapping which a person may have on hand for any purpose is covered by a limitation to $300 worth of strapping or a customer's anticipated requirements for the ensuing 45 days.

Order L-197 Amended

Order L-197 was amended on March 31, 1945, and we quote the following changes which affect all persons using drums in the chemical industry.

"The base period for calculating quarterly usage of steel shipping drums has been advanced from the corresponding quarter of 1943 to the corresponding quarter of 1944, . . ."

"The base period was changed for the purpose of providing a more equitable distribution, the Containers Division said. During 1943, when Order L-197 was new, many items were not allowed to be packed in steel drums. Subsequently, such packing was permitted. During 1944, a large number of adjustments were made to compensate for this variation. By using 1944 as a base period, such adjustments can be continued automatically without the necessity for reprocessing applications, thus reducing paper work on the part of industry, the division pointed out. By basing quotas on actual rather than permitted 1944 usage, any excess quotas will be removed.

"Schedule A of the order, which lists classes of products and their permitted quotas of new drums, has been simplified by consolidating certain commodity classes, which will permit more flexible operation under the order."

The quota in most all cases, so far as chemical packaging is concerned, is reduced to 90 per cent of the base period use, which means that the usage of new steel shipping drums for the base period in 1945 can only be 90 per cent of the new drums used in the corresponding base period of 1944.

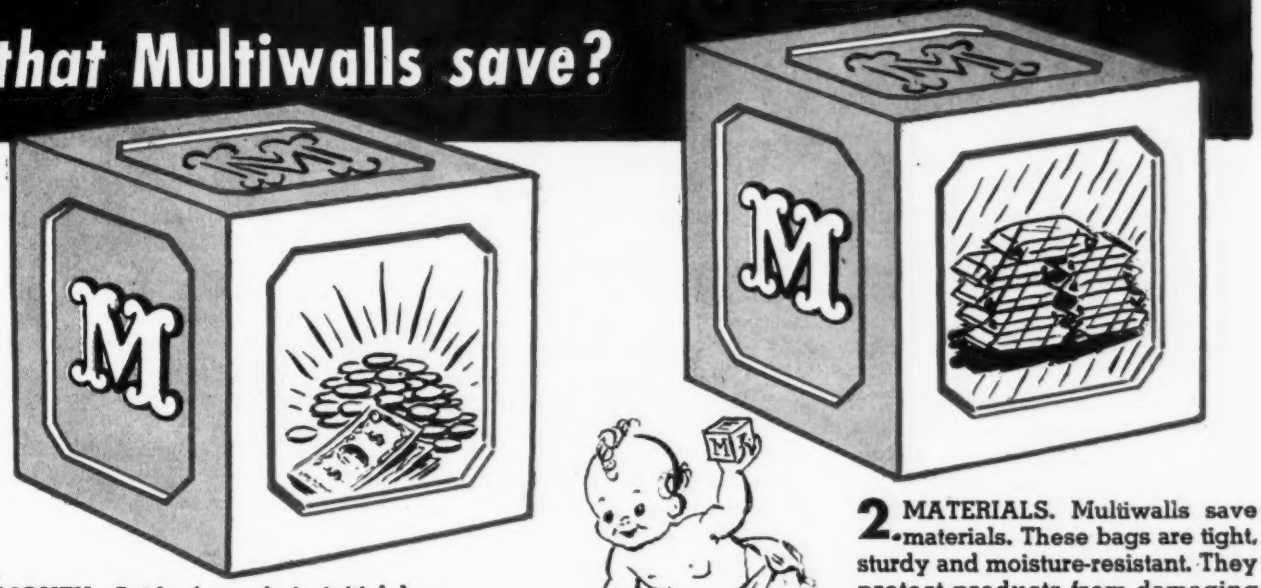
Steel Drums Standardized

A release from the War Production Board on March 23 is of particular interest to users of 55-gallon steel drums for all military and other Federal Government orders.

We quote the release as follows:

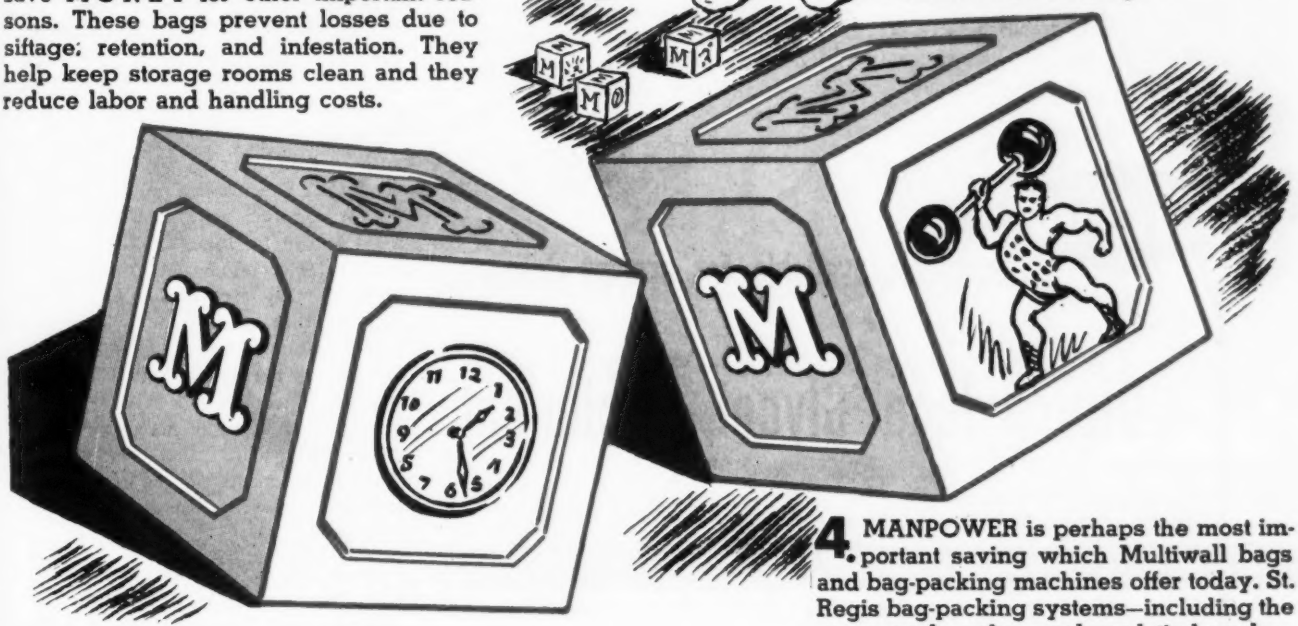
"Steel drum manufacturers will be able to concentrate on the production of a single design of 55-gallon steel drum for all military and other Federal Government orders as the result of the issuance of a new Federal specification

Can you name the four M's... that Multiwalls save?



1. MONEY. Aside from their initial low cost, St. Regis Multiwall paper bags save M-O-N-E-Y for other important reasons. These bags prevent losses due to siftage, retention, and infestation. They help keep storage rooms clean and they reduce labor and handling costs.

2. MATERIALS. Multiwalls save materials. These bags are tight, sturdy and moisture-resistant. They protect products from damaging dampness and rough handling in transit and in storage.



3. MINUTES are also saved by using Multiwall Paper Bags. These bags are quickly filled and quickly loaded . . . quickly and easily opened, too.

4. MANPOWER is perhaps the most important saving which Multiwall bags and bag-packing machines offer today. St. Regis bag-packing systems—including the sewn pack, valve pack and tied pack—actually enable more work to be accomplished with less men.

The St. Regis Paper Company offers you a complete packaging service. Our packaging engineers will be glad to cooperate with you in the development of a packaging system which will be custom-made to fit your individual requirements.

For complete information call your nearest St. Regis office today.

St. Regis MULTIWALL PAPER BAGS

MULTIPLY PROTECTION • MULTIPLY SALEABILITY

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Seattle, Wash. Nazareth, Pa. Toledo, Ohio

for this type of drum, the Conservation and Salvage Division of the War Production Board reported today.

"The new specification, RR-D-729 (Drums: Steel, Type 5-B for Petroleum Use) was issued by the Director of Procurement, Treasury Department, for use of all departments and establishments of the Federal Government. Copies may be obtained about April 15 from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

"The 55-gallon steel drum specification is the result of nearly two years of study by a joint committee of WPB and the armed services, working in cooperation with the Technical Committee on Shipping Containers of the Federal Specification Executive Committee, the National Bureau of Standards and the Steel Barrel Manufacturers Council. It consolidates the views of industry and the requirements of the Government, and eliminates the separate drum specifications of the Army Air Forces, Quartermaster Corps and the Navy Department.

"The new specification features standard drum plug and flange thread dimensions, which were developed in cooperation with the American Society of Mechanical Engineers as a proposed American standard. It includes requirements for thickness of steel, form of chime and chime reinforcement, and protective coating. Methods of inspecting and testing drums are described in detail, and drawings of the drum, chime sections and flanges are included."

I. C. C. Regulations Amended

The Interstate Commerce Commission Regulations for the Transportation of Explosives and Other Dangerous Articles was amended on the 25th of March, 1945. The following amendments are of particular interest to the chemical industry.

Dichlorodiphenyltrichloroethane (DDT) is classified as a Class B poison and subject to all the restrictions as to shipping and packing of Class B poison solids. Shipments of this material must carry the regular ICC Class B poison label.

Section 16 of the I.C.C. Regulations was amended by the addition of the following note:

"(a) Shipping containers, unless otherwise provided herein, used hereafter in shipping explosives or other dangerous articles must have been made and marked in compliance with specifications prescribed herein or with specifications of the Commission in effect at date of manufacture of container." This was further amended by the inclusion of the following paragraph listed as (a) (1) to Section 22:

"Provided, however, that because of the present emergency and until further order of the Commission, containers approved for emergency or experimntal shipments may be authorized in the discretion of, and upon special permit to be issued by the Director, Bureau of Service, Washington, D. C."

Section 272 which covers the packing of sulfuric acid was amended as follows:

"Spec. 5A.—Metal barrels or drums only for acid of 1.7059 specific gravity (60° Bé. Tolerance plus 0.2°); or acid of 1.81 specific gravity (65° Bé.) or greater strength; or when the strength of the acid is 60-65° Bé. and the acid has been treated with an inhibitor that renders its corrosive effects on steel no greater than 66° Bé. commercial sulfuric acid."

Prior to this amendment paragraph (g) of Section 272 read as follows:

"Spec. 5A.—Metal barrels or drums only for acid of 1.81 specific gravity (65° Baumé) or greater strength or when the strength of the acid is 60-65° Baumé and the acid has been treated with an inhibitor that renders its corrosive effects on steel no greater than 66° Baumé commercial sulfuric acid."

Section 332 paragraph (a)(2) is amended by the addition of the following note:

"Because of the present emergency and until further order of the Commission, non-I.C.C. Specification containers used for hydrocyanic acid, liquid (Prussic acid), prior to June 15, 1943, under laws, rules or regulations of the states in which they are transported and so long as they are maintained in safe transportation condition, are authorized for use in the transportation of this material by contract or private carrier by motor vehicle, in intrastate commerce only, within those states. All other requirements of the Commission for such transportation must be complied with."

Fibre Records Necessary

Directive 3 to Limitation Order L-317 prohibits acceptance of new fibre shipping containers under this order where the packer keeps no record of his 1944 and 1945 usage.

The War Production Board on April 4 issued the following directive on Limitation Order L-317:

"(a) *Record keeping requirement.* A packer must determine his 1944 and 1945 lawful usage of new fibre shipping containers that are subject to the quota restrictions of paragraph (g) or (h) of Order L-317 (in terms of footage and poundage of containerboard) and must preserve for inspection by War Production Board officials a written record of his figures and work sheets showing how he made his

DOW
chemicals available for prompt delivery

Dipropylene Glycol, Technical

Dipropylene Glycol is an outstanding high-boiling solvent for many organic materials. It is completely miscible with water and with a long list of other substances, including the following:

Tall oil (ligro)	Pine oil	Ethyl ether
Perchlorethylene	Diethanolamine	Dichlorethyl ether
Monochlorbenzene	o-Dichlorbenzene	Benzene
Dibutyl phthalate	Castor oil	Toluene
Monoethanolamine	Carbon tetrachloride	Dextrin (10% in H_2O)

It also dissolves, to a varying degree, such diverse materials as coconut oil, linseed oil, VMP naphtha, urea, kauri gum, and rosin.

Dow can make immediate shipment of Dipropylene Glycol, Technical, in 55-gallon drums or tank car lots. Your inquiries will be given prompt attention.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

Anopheles punctulatus
malaria-carrying mosquito

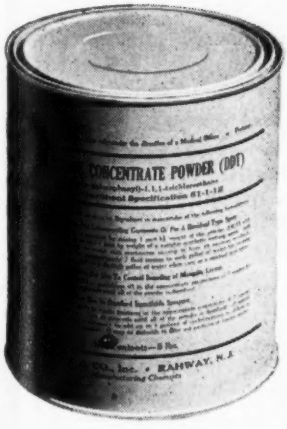
Pediculus humanus (female)
typhus-bearing louse

Crown Cans

guard conqueror of disease-bearing pests!

IN the development of DDT, destroyer of the malaria-carrying mosquito and the typhus-bearing louse, scientists see a day when the earth will be forever rid of two scourges that have recurrently decimated populations since time immemorial.

Merck & Co., Inc., of Rahway, N. J., who manufacture it for the U. S. Navy, take the precaution to package this new wonder insecticide in Crown cans. For, despite the rigors of many handlings and widely varying climatic conditions incident to the thousands of miles this vital chemical must travel, Crown cans assure its complete protection . . . the retention of full strength . . . thus preserving the lethal qualities of DDT ready for lifesaving service in pestilence-endangered areas throughout the world.



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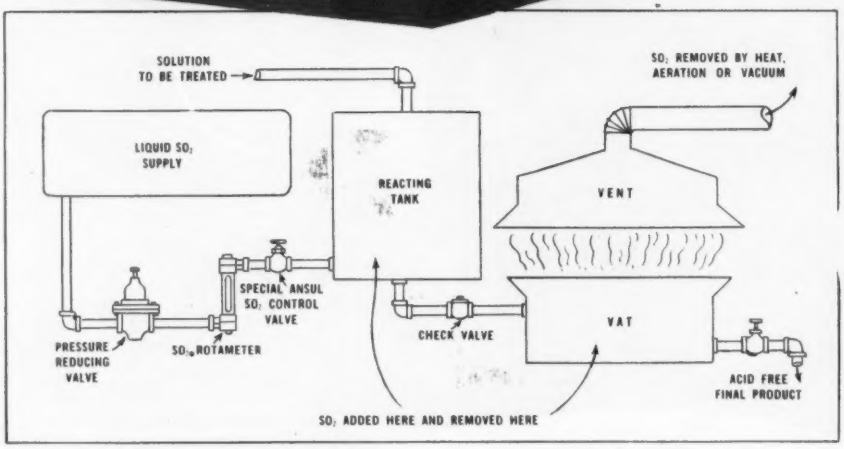
INDEPENDENT AND HELPFUL

CROWN CAN COMPANY • NEW YORK • PHILADELPHIA
Division of Crown Cork and Seal Company, Baltimore, Maryland

EVAPORATE
EXCESS ACIDITY

Use ANSUL SO_2 as an acidifying agent and remove excess by heat, aeration or vacuum



Here is a typical SO_2 acidifying and precipitating system showing how the SO_2 is introduced and excess acidity removed.

• Ansul SO_2, a volatile acid, provides distinct advantages over mineral acids when used as an acidifying and precipitating agent. 1—Excess acidity is easily eliminated. 2—Residual acidity that might otherwise be concentrated as an impurity in the final product is minimized.

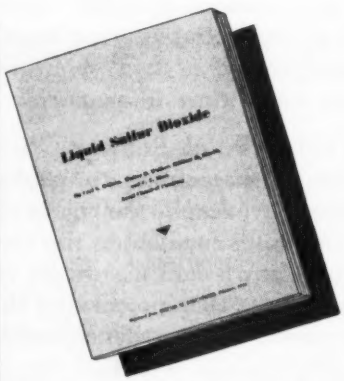
Ansul Liquid SO_2 is pure, inexpensive—easy to handle. It has unusual bleaching and preservative qualities and its use results in products of greater purity.

LIQUID Sulfur Dioxide BY ANSUL

PHYSICAL PROPERTIES

Chemical formula	SO_2
Molecular weight	64.06
Color (gas and liquid)	Colorless
Odor	Characteristic, pungent
Melting point	−103.9° F. (−75.5° C.)
Boiling point	14.0° F. (−10.0° C.)
Density of liquid at 80° F.	(85.03 lbs. per cu. ft.)
Specific gravity at 80° F.	1.363
Density of gas at 0° C. and 760 mm.	2.9267 grams per liter (0.1827 lb. per cu. ft.)
Critical temperature	314.82° F. (157.12° C.)
Critical pressure	1141.5 lbs. per sq. in. abs.
Solubility	Soluble in water
Purity	99.9+% (by wt.) SO_2 (H_2O less than 0.01%)

*REG. U. S. PAT. OFF.



Send for your copy of "Liquid Sulfur Dioxide"—a treatise on the properties, characteristics, and industrial uses of Liquid Sulfur Dioxide—written by the Ansul Technical Staff.

ANSUL CHEMICAL COMPANY, MARINETTE, WIS.
Eastern Office: 60 E. 42nd St., New York City

calculations of such 1944 and 1945 lawful usage.

"(b) *Prohibition on acceptance of containers where written record is not preserved.* Where a packer has not made and preserved the above-described written record, he must not accept any new fibre shipping containers that will be subject to the quota restrictions of paragraph (g) or (h) until such time as the War Production Board establishes for him in writing his base period usage of such containers (in terms of footage and poundage of containerboard.)

"(c) *Establishment of base period usage by War Production Board pursuant to appeal.* A packer may make application for the establishment of such base period usage by filing a letter pursuant to the provisions of paragraph (q) (1) of Order L-317 with the Containers Division, War Production Board, Washington 25, D. C. A packer must include in such application his best estimate of the new fibre shipping containers (in terms of footage and poundage of containerboard) he used in 1944 and 1945 for each class of products listed in Schedule III and for wholesale and retail deliveries (as defined in paragraph (b) (4) of all listed and unlisted products. A packer's usage for each Schedule III class of products must be listed separately. A packer must show all the facts upon which his estimate of such usage is based."

All users of new fibre shipping containers, except drums, must comply with this directive, and if this directive is not complied with, a packer may find himself unable to procure the necessary fibre shipping cases for his use.

Drums for Viscous And Solid Materials

In our article on the so-called single trip containers, we discussed the ICC 17 series of drums which, except during this war emergency, have been classified by the Interstate Commerce Commission as single trip containers. These containers are generally referred to as the single-trip non-returnable liquid drums. Next month we shall discuss the ICC 37 series of steel containers which are generally referred to as the single-trip non-returnable type drums for dry or semi-liquid materials. This series consists of the ICC 37D, ICC 37E, ICC 37F, ICC 37G, and ICC 37H specifications, which we shall cover in detail. We shall also discuss the modifications from the ICC 37D construction which are allowed in the other specifications in this series.

It is well to note that in the ICC 37 series all drums may be constructed with removable heads, providing that they will pass the required test for the particular specification.

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SINCE carbon and graphite and "Karbate" materials* are readily formed and machined into intricate shapes with precise dimensions, they are easily fabricated into equipment and structures of utmost utility for the metals, chemical, mechanical and other industries.

Examples are the injector-ejector, cooler-absorber, and five-way valve illustrated . . . each built of accurately finished pieces and each having the combination of properties for its job possessed by no other materials.

In the metals industries, applications run from the metallurgical tray shown to durable furnace linings easily built of fitted carbon blocks. A broad line of processing equipment—standardized or to your design—meets exacting demands of the chemical industries . . .

For detailed information on these and many other applications of "National" carbon and graphite and "Karbate" formed or fabricated products, write to our nearest division office for Catalog Section M-8000-A.

*Impervious carbon or graphite

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KEEP YOUR EYE ON THE INFANTRY . . . THE DOUGHBOY DOES IT!

PLANT OPERATIONS NOTEBOOK

New Way to "Stretch" Storage Tanks

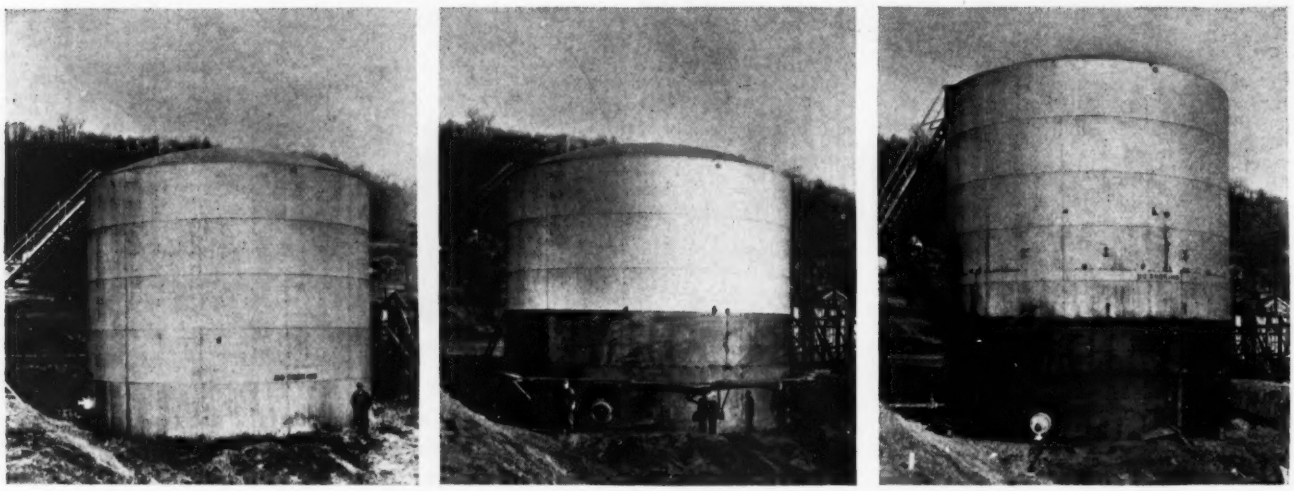
A new method by which liquid storage tanks may be enlarged to as much as twice the initial size without dismantling the original structure has been developed by the Stacey Brothers Gas Construction Company.

The old tank is literally boosted to new capacity height, and new rings are added at the base by a patented process which makes use of virtually all of the original structure in assembled form. Such reuse, along with the utilization of the original foundation and the minimum dislocation of connections, contributes much to the economy of the process as well as to the speed with which a job may be completed.

This method will be particularly useful where facilities are crowded and there is room only for expansion upward, as, for the first time, an alternative to new tank construction to increase storage capacity, is provided.

The 100% increase in capacity is achieved by cutting the existing tank shell at the base, adding new radial plates, and building a new shell around the old structure to the desired height. Water is then run into the tank up to the new shell level, so that compressed air may be introduced to float the old cover shell up to the new level. Various controls hold the tank steady and level to 1/16", while 4" filler plates are inserted between the shells, and the two units are tack welded in place.

When the air pressure is released and the water drained from the tank, the two shell sections and fillers are completely seal welded on the outside. Inside, the old shell is trimmed and welded at intervals around its circumference, and the enlarged tank is ready for connections and service. The new method can be used to build up tanks having either umbrella type roofs, or those with roofs supported by center columns.



The original 300,000-gallon petroleum storage tank is shown at the left. On the fifth day, as shown in the center, the new shell structure is complete. By the seventh day the old cover shell has been raised and welded to the new section, as seen at the right, and the 425,000-gallon tank is ready for connection and painting.

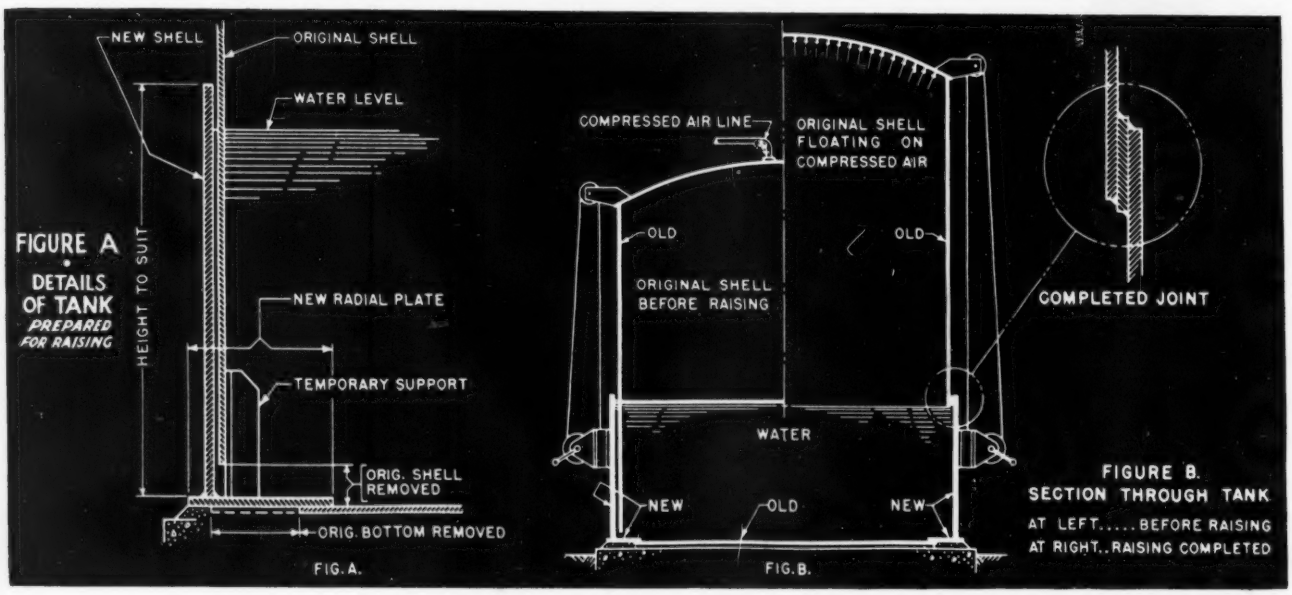
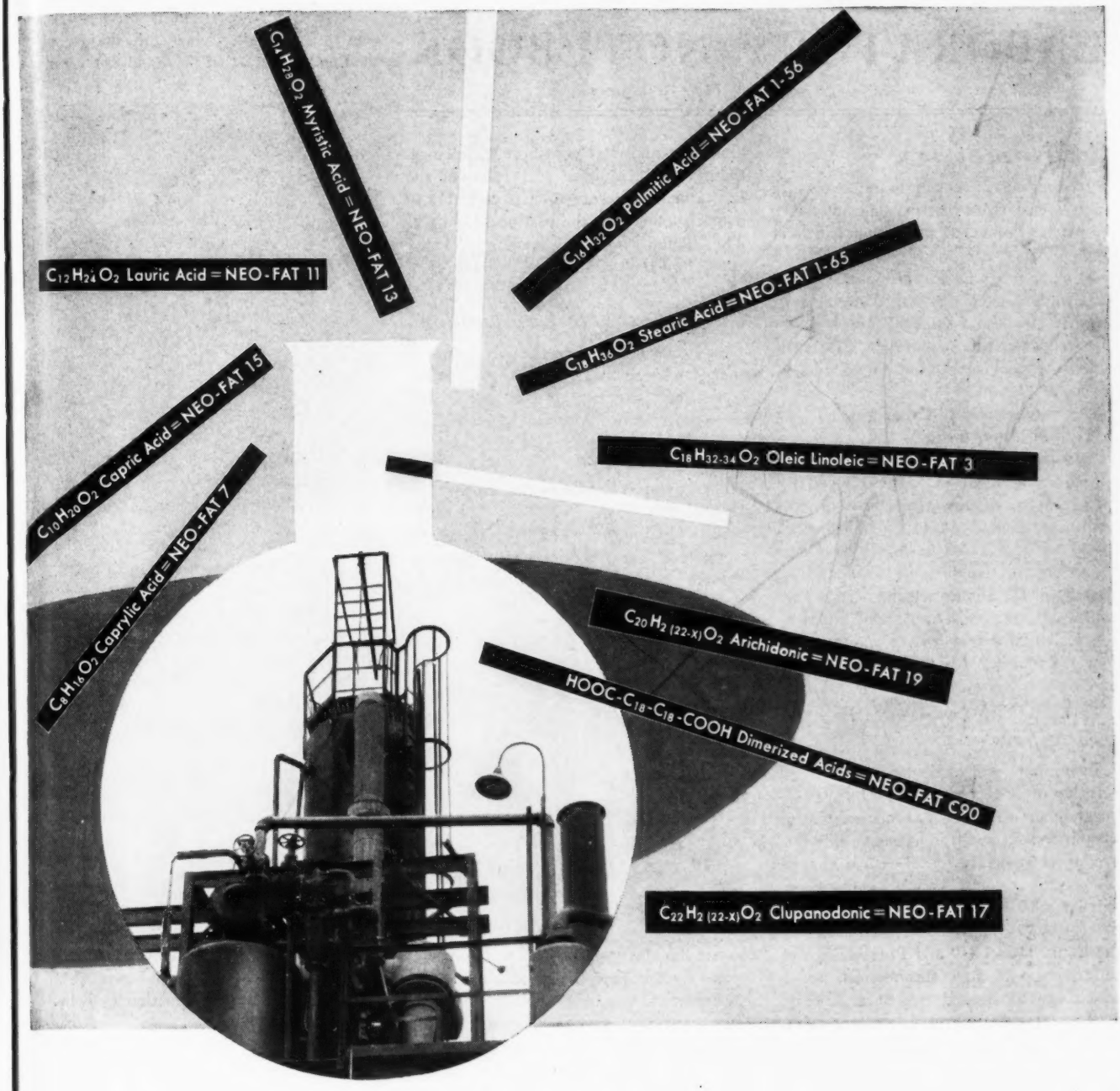


FIGURE A
DETAILS OF TANK *PREPARED FOR RAISING*

FIGURE B.
SECTION THROUGH TANK
AT LEFT.....BEFORE RAISING
AT RIGHT..RAISING COMPLETED


$C_{14}H_{28}O_2$ Myristic Acid = NEO-FAT 13
$C_{16}H_{32}O_2$ Palmitic Acid = NEO-FAT 1-56
$C_{12}H_{24}O_2$ Lauric Acid = NEO-FAT 11
$C_{18}H_{36}O_2$ Stearic Acid = NEO-FAT 1-65
$C_{10}H_{20}O_2$ Capric Acid = NEO-FAT 15
$C_{18}H_{32-34}O_2$ Oleic Linoleic = NEO-FAT 3
$C_8H_{16}O_2$ Caprylic Acid = NEO-FAT 7
$C_{20}H_{2\,(22-x)}O_2$ Arichidonic = NEO-FAT 19
HOOC-C_{18}-C_{18}-COOH Dimerized Acids = NEO-FAT C90
$C_{22}H_{2\,(22-x)}O_2$ Clupanodonic = NEO-FAT 17

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LABORATORY NOTEBOOK

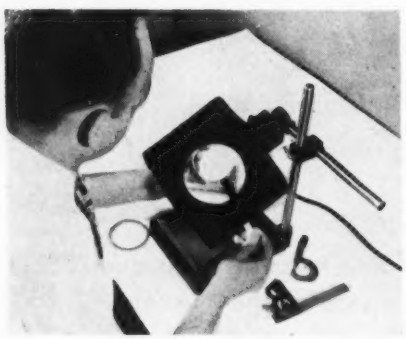
Controlled Suction

It is often convenient to remove volatile solvents from reaction tubes or flasks by placing the vessel in a water bath and applying suction by means of a glass tube inserted through a rubber stopper. There is always danger that the material may begin to foam and some of it lost before the stopper can be withdrawn. If a two-holed stopper is used or an opening is made in the glass tube over which a finger may be placed, air may be allowed to rush in instantaneously at any time.

The same situation obtains in the destruction of foam in volumetric flasks. Schrimshaw, of the University of Rochester (*Science*, vol. 101, p. 156, Feb. 9, 1945) has found that in making solutions up to volume, troublesome foam may be destroyed by application and rapid removal of suction. The danger of drawing some of the sample over may be minimized by using the technique outlined above.

Magnifiers

Inspection work demanding careful scrutiny of small objects is performed accurately and easily with Ullman C-Master magnifiers. Newest additions to this line are three recently developed all-angle, illuminated models. Two of these are stand models and the third is a portable hand type. The lighting equipment of the Stand Model 410 and Portable Model 610 consists of four incandescent tubes which can be lighted two at a time or all four at once. Two fluorescent tubes are used in Stand Model 210. Shadow-free, compact, and easy to handle, all three models are ideal for continuous inspection where magnification plus light is required.



A large, clear 4½-inch double convex lens, ground and polished, magnifies all objects twice up. Squinting and eyestrain are eliminated, since these all-angle, swivel-action magnifiers provide undistorted view of work inspected. Strongly built of cast aluminum and steel with bronze bearings, these magnifiers have real value in the laboratory and wherever it is desirable to magnify objects in the best possible light. The Ullman Products Company is located at 857 Fourth Avenue, Brooklyn 32, N. Y.

Poly Phosphate Comparator

Low concentrations of the poly (glassy) phosphates, such as hexameta-, pyro-, septa-, etc., are coming into more and more general use. A simple, rapid and accurate method of analysis is therefore imperative.

The Taylor Poly Phosphate Comparator, developed by W. A. Taylor & Co., 7300 York Road, Baltimore 4, Md., is claimed to be ideal for this purpose. Previous methods required several hours' boiling to

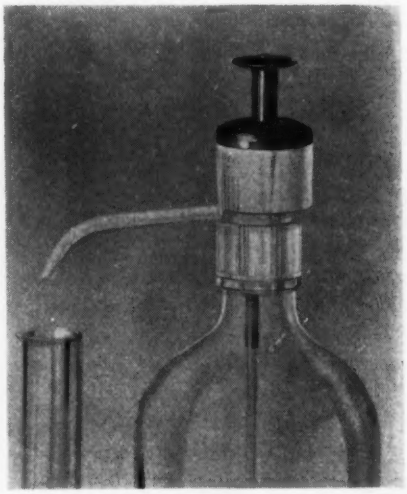
convert the glassy phosphates to the ortho form. By the Taylor method a complete determination requires only 20 minutes. After conversion, two reagents are added separately and the blue color formed is compared with the standards. This gives the total phosphate content. A determination on the cold sample (no boiling) gives the ortho present in the sample. The difference is the poly phosphate.

The outfit consists of a comparison block containing 8 standards, 0, 0.5, 1, 2, 4, 6, 8, 10 ppm, 2 comparison tubes, funnel, filter paper, graduate, flask and reagents. All equipment is contained in a wooden carrying case 9¼ in. long, 6¼ in. wide and 9 in. high.

Laboratory Pump

An acid- and alkali-resistant laboratory pump has been developed by the U. S. Stoneware Co., Akron, Ohio.

Briefly the Tygomatic pump, as it is called, consists of an injection molded acid-and-alkali resistant body, and plunger. The gaskets used to effect the seal are made of sponge neoprene rubber, internally lubricated for smooth action. The metallic spring which forces the plunger back to normal position is of a corrosion-resistant alloy, but the design of the pump is such that no liquid nor vapor



can contact the metallic spring, enabling it to stand up for long periods of time.

To use the pump, a glass tube, or a clear, flexible Tygon tube is attached to the pump inlet and immersed below the solution level. A cork, rubber stopper, or a screw cap (as found on many acid bottles) is fitted around the pump inlet, and, in turn, is fitted into the neck of the bottle.

Some of its practical advantages are listed by the company as follows:

1. The pump, when once installed, performs as a permanent dispenser, and seals off the solution from the air at the same time, thus retaining the concentration of the solution indefinitely.

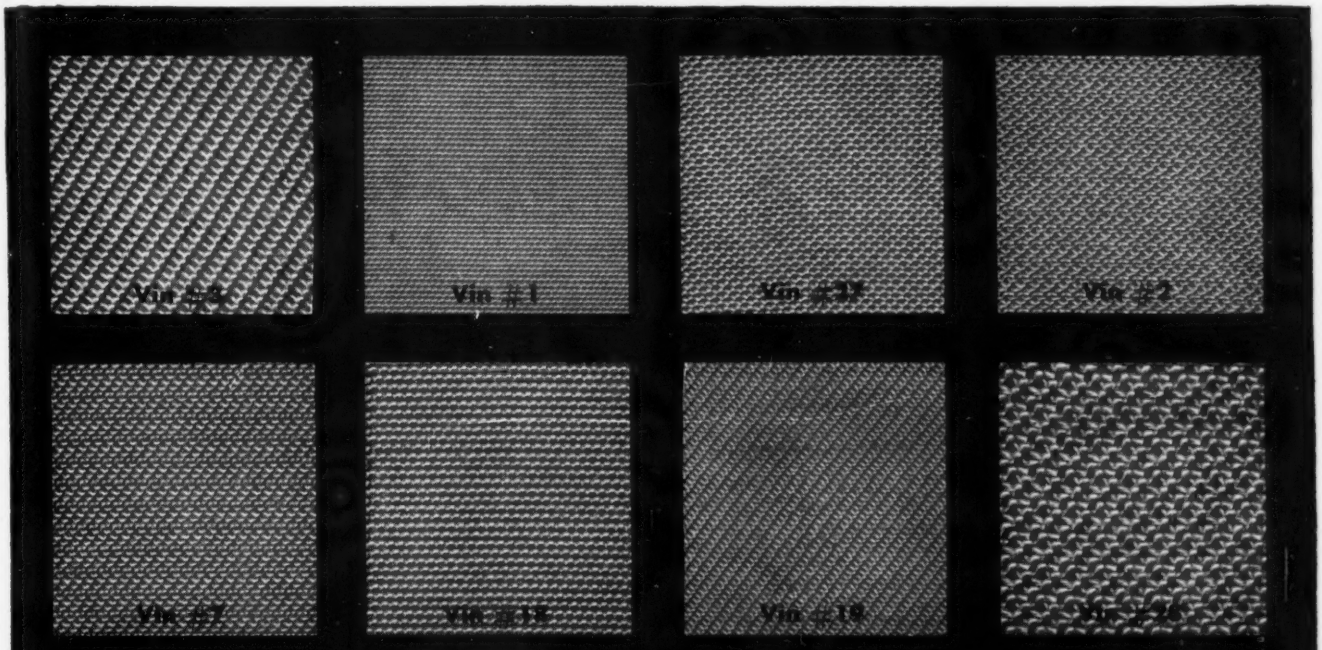
2. The pump delivers an accurate amount of liquid, governed by the length of time the plunger is held down, thus effecting a substantial reduction in solution loss.

3. Solutions will not drip at the outlet, nor dribble down the sides of the bottle, preventing corrosive attack on laboratory benches and table tops, and assuring safe handling of bottles.

4. The pump can be easily adapted to fit any size bottle.

Two important precautions in the use of the Tygomatic laboratory pump should be noted. First, the pump should not be under repeated contact with concentrated acids and concentrated alkalies. If acids or alkalies with concentrations exceeding 60% are to be dispensed, the pump should be flushed with water occasionally, and should not be allowed to be in contact with the solution for more than 24 hours. Otherwise dimensional changes may occur in the pump which would cause sticking of the plunger. Second, the pump should not be used to dispense such solvents as aromatic hydrocarbons, aliphatic hydrocarbons, ketones, esters, or chlorinated hydrocarbons. The pump, however, can be used to dispense alcohols and ethers.

VINYON* FIBER



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FILTER FABRICS

If you have a filter fabric problem in connection with any of the processes or products listed below, Vinyon fiber filter fabrics may be the solution. Subject always to certain heat limitations, Vinyon is highly resistant to corrosive fluids.

Perfected and developed through careful field studies, Vinyon fiber filter fabrics are now solving many problems in the filtration of mineral acid and alkali solutions.

Longer life, higher efficiency and therefore ultimate economy are characteristic of Vinyon fiber filter fabrics that will be of interest to you. The engineers on our staff are in a position to discuss with you the possible application of Vinyon fabric to your particular problems. When writing please include all information regarding your present filtration process.

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- Pigments and Dry Colors
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- Salt Solutions
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INDUSTRY'S BOOKSHELF

Equipment Design Discussed

PROCESS EQUIPMENT DESIGN *by Herman C. Hesse and John Henry Rushton.* D. Van Nostrand Company, Inc., N. Y., 1945; 580 pp., $7.50. Reviewed by *A. E. Chute,* Foster Wheeler Corporation.

THIS BOOK PRESENTS the elements for the mechanical design of equipment most commonly used in the chemical industries. It is primarily a text for advanced students of chemical engineering and for graduate engineers "who may not have studied the elements of design as related to the process industries."

Two short chapters on materials of construction and strength of materials are followed by chapters on riveted and welded pressure vessels and a review of mechanics. The authors then present design fundamentals on threaded fasteners, structures, trusses, piping, attachments and closures, non-ferrous, concrete, wood and other non-metallic construction, belt and chain drives, gearing, shafting, bearings, handling equipment and mechanical frames. The last chapter is devoted to special stress applications, such as the design of vessels for external pressure, stuffing boxes, and high pressure equipment. At the end is a list of fifty-eight references to handbooks, codes, technical papers and manufacturers literature.

Numerous drawings, diagrams, curves and tables supplement the text, although few photographs, either cut away or otherwise, are included. Descriptions, definitions and derivations introduce each subject, followed by stress analysis and formulae and their relationship to governing codes. Sample computations showing the application of the design methods are sprinkled liberally throughout, and several problems are appended to each chapter.

The summaries of the codes are presented clearly and concisely in contrast to the scattered data in code books. This treatment could have been made more complete by illustrating typical non-permissible types of construction as well as the permissible types shown.

While inclusion of data for the design of all types of process equipment is beyond the scope of this work, the omission of methods and codes for the design of pumps and heat exchange equipment is at once glaring. Relief valves, which are required by code on all pressure vessels, are not mentioned.

On the whole, however, this book fills the need for text on the elements of design as specifically related to chemical engineering rather than mechanical equipment in general.

Powder Metallurgy

PRINCIPLES OF POWDER METALLURGY *by Franz Skaupy,* Philosophical Library, New York, 1944: 80 pages, $3.00.

THE INCREASING USAGE of powder metallurgy techniques had produced a demand for a short survey of this field. This the author has attempted to do by first giving a short general discussion of the relationship between crystal structure and physical properties, dividing the remainder of the book into two sections, the first discusses the properties of and methods of producing metal powders, and the second the production and properties of the products which can be formed by these techniques. This discussion is marred for the general reader by the emphasis placed on the application of powder metallurgy to the formation of incandescent lamp filaments and the production of parts from high speed steel and other hard metals, such as boron carbide. The work appears to have been edited in great haste.

New Concise Mathematics Book

BASIC MATHEMATICS FOR WAR AND INDUSTRY *by Paul H. Daus,* professor of mathematics, U. of Calif.; *John M. Gleason,* assistant professor of mathematics, San Diego State Coll.; and *William M. Whyburn,* professor of mathematics, U. of Calif. The MacMillan Company, New York, 1944; 277 pp.; $2.00.

THE ELEMENTARY principles of arithmetic, algebra, trigonometry and geometry—plane, solid, and spherical—are presented for the instruction of the neophyte and the refurbishment of those who have lost touch with the field. Problems are given (with answers) and tables of logarithms, powers, roots and trigonometric functions are provided.

Standard Oil Forum Speeches

THE FUTURE OF INDUSTRIAL RESEARCH *by Standard Oil Development Co.,* 1945.

A COLLECTION has been made of the complete texts of the speeches which were presented last fall at the Standard Oil Development Company's Silver Anniversary Forum. Summaries of several of these talks were published in an article which appeared in the November, 1944, issue of Chemical Industries.

Frank B. Jewett, Thomas Midgley, Jr., Harry L. Derby and Bradley Dewey discussed industrial research from the view of physicist, chemist, industrial management and small and large business, respectively. "Research by the Business Itself" by Edwin H. Land, "Research by Government and Its Value to Small Business" by A. C. Fieldner, and "National Defense and Industrial Research" by Robert P. Patterson are of particular interest.

Technical Dictionary

GERMAN-ENGLISH DICTIONARY OF METALLURGY *by T. E. R. Singer,* formerly in charge, Chemistry Reading Room, N.Y. Public Library. McGraw Hill, New York, 1945; 298 pp.; $4.00.

VERY SIMILAR to Patterson's dictionaries, this work eliminates the simple words of nontechnical interest, devoting itself entirely to the precise meanings of terms used in metallurgy, metallography, mining, minerology, crystallography and the working of metals.

Text for Standardizing Solutions

THE STANDARDIZATION OF VOLUMETRIC SOLUTIONS *by R. B. Bradstreet.* Second edition. Chemical Publishing Co., Inc., Brooklyn, N. Y. 1944; 151 pp., $3.75.

THIS IS a completely revised and enlarged edition of a volume which has been used with success as a practical reference work. It describes useful methods for preparing standard solutions (with discussions of their good and bad points), and provides helpful hints, equations, and tables of important data: logarithms of volumetric factors and lists of precipitation and reducing agents.

Other Publications

SIXTEENTH BOSTON CONFERENCE ON DISTRIBUTION 1944. A report on this national forum, which convened in October 1944, to consider fundamental issues which will face business in the postwar period, has been published in a 106-page catalog. It may be obtained from Daniel Bloomfield, 80 Federal St., Boston 10, Mass., Price $3.75.

PROCEEDINGS OF THE TWENTIETH ANNUAL CONVENTION OF THE NATIONAL FERTILIZER ASSOCIATION 1944 have been recorded and bound in a small 75-page book with a stiff cover. The following addresses are outstanding: Cooperation between Chemicals and Fertilizers Branch, Office of Materials and Facilities, and Industry, by Philip H. Groggins; Post-War Relations between Government and Industry, by Charles J. Brand and The Fertilizer Supply Outlook, by Dale C. Kieffer.

A. S. T. M. STANDARDS 1944 issued in three parts, contains in their latest approved form all of the Society's widely used specifications and tests for materials. This edition includes specifications and standard methods which cover more than 6000 pages. The volumes are divided as follows: Part I, Metals; Part II, Nonmetallic Materials — Constructional, and Part III, Nonmetallic Materials—General. Copies may be obtained from the Society at 260 South Broad St., Philadelphia, Pa.

INDUSTRIAL HOUSEKEEPING MANUAL by R. F. Vincent is a cloth bound volume of 116 pages which condenses to twelve chapters information required by supervisors of cleaning operations in plants and offices. It includes selection, use and care of cleaning equipment, working schedules and vermin extermination. Published by National Foremen's Institute, Inc., Deep River, Conn. Price $2.50.

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Later, each nickel panel was individually tested for leaks under air pressure between lining and steel—it worked!

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BOOKLETS & CATALOGS

Chemicals

A781. CHEMICALS. "New Benefits for the World from Synthetics," is the title of a booklet designed to illustrate some of the more important qualities of Celanese textiles, plastics, and chemicals. Celanese Corp.

A782. CHEMICALS. The Dow Chemical Co. has prepared a complete listing of their many products in alphabetical order, along with a corresponding list of the products of their subsidiary companies.

A783. CHLOROWAX titles an 8-page booklet of the Diamond Alkali Co. noting the physical and chemical properties, and suggested uses of resinous chlorinated paraffin which they produce.

A784. VULCANIZING AGENTS. Vultac, alkyl phenol sulfides for vulcanizing butadiene copolymer synthetic rubbers, is the subject of a 23-page booklet giving detailed data concerning the results that can be attained by these new agents in comparison with the results obtained with sulfur. Sharples Chemicals, Inc.

Equipment—Methods

F336. ABRASER. The Taber Instrument Corporation has issued a folder describing the Taber Abraser which is designed for the determination of the wear or abrasion resistance of practically every material that is subject to surface abrasion.

F337. AIR POWER. A 24-page booklet, primarily photographic in content, describing many of the different ways in which air power can be employed, has been issued by the Ingersoll-Rand Co.

F338. CATHODE RAY TUBES. A 16-page illustrated booklet, describing the early history, manufacture, testing, and special tube designs, is available from the North American Philips Co.

F339. CERAMICS. Property charts and other technical data, together with practical information on manufacturing processes for the preparation of AlSiMag ceramic bodies for many different applications are included in an illustrated bulletin of the American Lava Corp.

F340. BLOWERS. The new 16-page bulletin of the Allen Billmyre Co. describes design and construction features and the principles of operation of the Pottstown rotary positive displacement type blowers and exhausters.

F341. COATING MATERIAL. Full details concerning a new waterproof coating material, Liquinoleum, are contained in descriptive literature issued by the Continental Asbestos and Refining Corporation.

F342. COKE OVEN. The Wilputte Coke Oven Corporation has issued a 30-page illustrated booklet describing the features of the Wilputte Ovens.

F343. COUPLINGS. Shaft couplings of the flexible, rigid flanged-face and compression types are described in an 8-page illustrated booklet in which dimensions and list prices are given.

F344. DUST COLLECTOR. The type EC multi-wash dust and fume collector is described in a 4-page folder of the Claude B. Schneible Company.

F345. ELECTRONIC HEATING. Scientific Electric has issued a 16-page booklet noting the historical background, principles of operation, and suggested fields of application of electronic heating.

F346. FEED WATER HEATERS are the subject of a bulletin of the Cochrane Corp. The different types of heaters are described and illustrations of their method of application are given.

F347. FLEXIBLE METAL HOSE. The complete Packless line of hose constructions, as well as flange and coupling types, vibration absorbers, laundry and platen press units, and other specialties are illustrated and described in a 60-page booklet of the Packless Metal Products Corporation.

F348. HARD-FACING OF METALS is the subject of a 30-page booklet in which the effect of heat on metals during the hard-facing process is noted, particular attention being paid to the electric process and the acetylene process. A fairly detailed discussion of two actual applications, hard-facing crusher jaws and grader blades, is included. Mir-O-Col Alloy Co.

F349. HYDRAULIC PRESSES. A 4-page folder is available from the John S. Barnes Corp. illustrating and describing their line of hydraulic presses.

F350. LIFT TRUCK. The Towmotor Corporation has issued a 15-page booklet noting the proper and improper ways to employ lift trucks, using both word and picture. A list of safety rules is appended.

F351. OVENS. A 27-page illustrated booklet has been issued by the Gehnrich Oven Division of the W. S. Rockwell Co. as an aid in the selection of the right oven for baking, drying, and curing operations.

F352. PACKAGING. In the booklet, "Arrived O. K.," of the Minnesota Mining and Manufacturing Company actual photographs are utilized to illustrate the step-by-step operations involved in sealing fibreboard and V-board shipping containers and waterproof case liners for export shipment. Detailed information on adhesives made to withstand rough treatment, extremes in temperature and high humidity is also given.

F353. RADIANT HEATING. How to calculate, design and install wrought iron radiant heating systems for all types of structures is described in a new 52-page handbook issued by the A. M. Byers Company.

F354. ROTAMETERS. The Cochrane Corp. has issued a 16-page catalog giving helpful data and discussing other factors involved in the selection of the proper rotameter for a given application.

F355. VERTICAL PUMPS. A bulletin describing the new vertical type Schneible "Wearproof" pump for handling sludges, slurries, and abrasive materials has been issued by the Claude B. Schneible Co.

F356. WELDING RODS. A 6-page folder from the Eutectic Welding Alloys Co. describes their rods for low temperature maintenance welding.

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U.S.I. CHEMICAL NEWS

May ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1945

SO_2 Household Fumigant Prepared with Acetone

In spite of its many desirable qualities as an insecticidal fumigant, sulfur dioxide has always been hard to handle because it is a gas at ordinary room temperatures. Mixed with acetone, sulfur dioxide becomes a definite liquid compound, whose vapor pressure is sufficiently low to allow it to be packaged in ordinary tin containers. Furthermore, a mixture of 1 part acetone with 1.9 parts sulfur dioxide, by volume, is non-inflammable in all concentrations in air. This liquid is stable while confined, but upon exposure to air decomposes and becomes progressively volatile.

In tests, the liquid was absorbed in diatomaceous earth pellets, and a quantity of these pellets was exposed in a room containing the test insects. The compound, when evaporated into the air, was lethal to the insects, which included bedbugs, flour beetles and carpet beetles. Treatment was harmless to wallpaper, white and colored fabrics, painted surfaces and metals.

Apparently the acetone-sulfur dioxide compound holds possibilities as a commercial fumigant, and will bear further investigation.

How to Make 2 = 3

This year, Washington reports, there will be *only two* War Loan drives, not three. But the total need is no less. For the Battle of Japan has just begun — and it's going to be a lot tougher and longer than many of us expect. So — let's stretch 2 into 3 by buying *bigger extra bonds* in this, America's Big Seventh War Loan drive.

Thermal Conductivity of Normal Alcohols

Recent studies at an eastern university have determined several new figures for the thermal conductivity of normal alcohols at 30 C. They are as follows:

Alcohol	*New figures*	*Others*
Methyl	0.00050	0.000503
Ethyl	0.00041	0.000433
n-Propyl	0.000380	0.000409
n-Butyl	0.000365	0.000400
n-Amyl	0.000365	0.000388

Pharmaceutical Lactones Yielded by New Process

Structurally complicated lactones, such as the cardiac poisons of the digitalis, strophanthus and squill series, may be prepared from easily-available products by a process discovered by a Swiss scientist. Basically, the process comprises condensing saturated or unsaturated lactones which are substituted by halogen with carbonyl compound. The condensing agents suggested include metallic alcoholates such as sodium ethoxide. Ether, acetone or both also enter into each of the four processes given as examples.

New U. S. I. Liquid Insulation Has Wide Range of Uses

Product Exhibits Remarkable Ability to Protect Electrical Systems from Moisture, Wet Weather and Many Acids

A unique insulating material which has won wide acceptance as a protector of electrical systems in automotive and amphibious combat equipment has been added to the list of products of U. S. Industrial Chemicals, Inc., according to a recent announcement. While the new product, trade-named PiB Liquid Insulation, will make an ideal companion product for the company's Super-Pyro Anti-Freeze in the automotive field, the company expects extensive expansion of PiB's market in the farm, marine and industrial fields.

This motor was removed from an oil burner in a flooded cellar where it had been "drowned out". PiB was sprayed into the motor and in a matter of minutes the motor was running smoothly. To test the "staying power" of PiB, the motor was then submerged in soapy water, where it has been running, intermittently, for two years without a hitch.

Long-Lasting Protection

The new product is described as a liquid with powerful penetrating action and high resistance to the action of water, ordinary acids, oils and greases. Its viscosity is low enough so that it flows freely into hard to-get-at nooks and crannies and can be easily applied by brush or spray. Good water-repellent properties coupled with a strong "wetting" action enable PiB to undermine and displace water which may be present in the wiring system or on insulating surfaces. PiB has a dielectric strength of 4000 volts per mil; its protective qualities, under normal conditions, last for a minimum of six months.

War-Tested

Ignition systems on amphibious combat equipment are subjected to the severest kind of conditions. Salt spray and soggy climates all tend to break down insulation and cause corrosion. The most important current use of PiB is in protecting the ignition systems of American amphibious war machinery.

PiB is winning increasing popularity among operators of buses, trucks and passenger cars. It is used to waterproof ignition systems, to prevent corrosion and current losses in batteries, to re-insulate cracked and dried-out wiring. In the marine and farm fields, PiB is seen to have a particularly bright future. From yacht to modest outboard, marine equipment of every type will benefit from the protection PiB affords against starting failures and the ravages of salt air. Farm equipment that must stand up under hard usage and

(Continued on next page)

New British Insecticide Exhibits High Potency

Efforts of a British concern to find an easily synthesizable replacement for scarce and costly derris have resulted in the development of a new insecticide which they report to be five times as potent as D D T.

The new substance is benzene hexachloride, briefly identified as "666" because of its formula $C_6H_6Cl_6$. Tests revealed that the gamma-isomer, present in the crude material in concentrations of from 10 to 12 per cent, was more toxic to weevils than any substance that this concern had ever tested. On the other hand, the alpha- and beta-isomers are virtually non-toxic.

If laboratory results are duplicated in commercial applications, new insecticide formulas will undergo drastic revisions.

Just brush or spray PiB Liquid Insulation on the plugs, wiring, distributor, coil terminals and battery of a water-stalled engine. Step on the starter and you're ready to roll! You can literally "hose down" an engine that has been properly treated with PiB and it won't even miss.

ADVERTISEMENT—*This entire page is a paid advertisement.*

May ★ **U.S.I. CHEMICAL NEWS** ★ 1945

Patent Granted on All-Purpose Insectifuge

As previously described in Chemical News, a government-developed all-purpose insect repellent is doing a remarkable war job in protecting our fighting forces against the variety of insects they encounter on different parts of the globe. One of the vital ingredients of this repellent is U.S.I.'s Indalone.

Recently, a patent has been assigned to the United States, as represented by the Secretary of Agriculture, covering the composition of the product. The patent describes it as a ternary solution comprising by volume from 33⅓ per cent to 80 per cent of dimethyl phthalate, and complementary equal parts of 2-ethyl-1, 3 hexanediol and n-butyl mesityl oxide oxalate. (Indalone).

Bitter Soya Taste Yields to Alcohol

The bitter, beany flavor of present-day soya flour has seriously limited the use of this mineral- and protein-rich flour in bakery products. A new alcohol process for extracting the soya-bean oil, however, gives promise of overcoming this handicap. According to a recent report, the new process leaves a sweet-eating bean for grinding into a flour which can be used in greater proportions for enriching bakery products.

Urethan May Play New Bactericidal Role

Experiments with urethan and other carbamates, such as butyl and prophyl, indicate that these compounds, when combined with sulfonamides, have unexploited possibilities as bactericidals and bacteriostatics, according to a recent report.

Indications are that, in addition, urea and urethane both antagonize slightly the sulfonamide inhibitors and that they increase the solubility and bacteriostatic activity of the sulfonamides. Both are effective mainly against Gram positive bacteria and to a lesser degree against Gram negative bacteria.

Tests indicate that urethan is superior to urea in all respects.

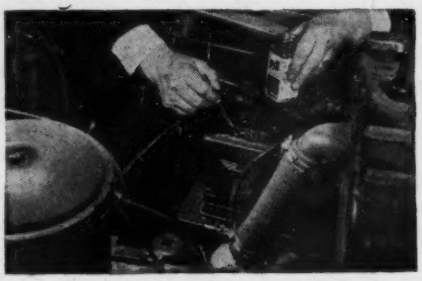
New Liquid Insulation

(Continued from preceding page)

exposure to weather also will give longer, more reliable service.

Industrial Uses

In industry, PiB appears to have limitless possibilities. Motors which operate in damp atmospheres can be protected simply by spraying with PiB. Open switchboards, control panels, automatic signaling systems and similar electric equipment can likewise be protected with PiB. The emergency uses of PiB—in treating drowned-out motors, leaking panel boards and other moisture-affected electrical equipment—should make it a "tool" every maintenance man will want to have in his kit.



Above, you see PiB being applied to a battery. Photo below shows test to determine current leakage. New battery shows no leakage. Used battery, prior to treatment with PiB, showed sufficient leakage to cause electrolysis and consequent corrosion of battery holders, cables and terminals. Same battery *after* PiB treatment showed no measurable leakage. It is estimated that periodic treatment with PiB can add 10 per cent to the life of a battery. However, PiB's biggest contribution to battery life is made indirectly — by assuring quick starting of motors even after long idleness in damp weather.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

A new plastic material, which is claimed to transmit as much visible light as window glass, yet block all harmful ultra-violet radiation, is now on the market. **(No. 931)**

USI

A transparent new fabric is described as being as sheer as voile, but with exceptional strength and wind and water resistance. It is available for development work. Suggested uses include rain-proof garments, shower curtains, etc. **(No. 932)**

USI

Grease-proof cellophane packaging is offered in the form of a new cellophane-cloth-wax laminate, which is specially recommended for wrapping of grease-coated metal parts. **(No. 933)**

USI

A cleaner for plastic glass, such as plexiglass, is offered for sale in bulk at a new low price. It is applied by a new sprayer which is said to speed cleaning and improve results. **(No. 934)**

USI

A new chlorinated paraffin, resinous in nature, is claimed to be both flame and moisture resistant, and to be non-toxic. **(No. 935)**

USI

Corrosion proofing of metal surfaces is said to be facilitated by a new wax concentrate sold in solution with petroleum solvents. The liquid, which may be applied by brush, dipping or spray, dries in an hour, remains flexible at minus 20 F., and will stand heat up to 214 F. **(No. 936)**

USI

A new synthetic-rubber latex, reported to be a modified type of butadiene-styrene, is announced. Suggested postwar uses include impregnation of paper and fabrics used in shoes and binding of fibres and hair for upholstery. **(No. 937)**

USI

An abrasion-resistant plastic, said to be 250 times as resistant to abrasion as boiler plate, is offered. It is claimed to be useful for such tough jobs as protecting sand-blast equipment. **(No. 938)**

USI

An alternate for Carnauba wax, which is said to take its place in paste floor polishes, automobile polishes, carbon paper and water-wax emulsions, is on the market. **(No. 939)**

USI

Heat-indicating bands, used as bottle seals, are designed to give warning when the bottle has been subjected to a temperature harmful to the contents. Under these conditions, the color of the band changes permanently from green to bright orange. **(No. 940)**

USI

A new enamel-like paint, for use on concrete, brick or wood exposed to water or moisture, is offered. Maker states that new paint affords better coverage than its predecessor and is resistant to yellowing and the action of corrosive fumes. **(No. 941)**

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Titre	35

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NEWS OF THE MONTH

Surplus Property Board Creates Disposal Division

Congressional hearings on the disposal of government-owned magnesium and aluminum plants have yielded valuable information concerning the necessity for controlled disposal of government-owned plants. The Surplus Property Board is establishing a plant disposal division which will make reports and recommendations for controlling policies and regulations.

The division will produce a "basic report," with the cooperation of various government agencies and private industry. It will include essential data on all government-owned plants costing $5,000,000, as well as some costing less. The most difficult problem of establishing the plants disposal division, according to Guy M. Gillette, S. P. B. chairman, is that of obtaining sufficient qualified personnel. The division is to have twelve industry sections, one for each of the classes of industrial surplus property specified in the Surplus Property Act.

Reports on plants will include cost, location, floor loads, sizes of bays, ceiling clearance, type of ventilation and heating, location of fire protection, water and sewer mains and power outlets. They will also note descriptions of each piece of capital equipment, summary of costs, plot plans, maps of plant vicinity, structural drawing and photographs along with information concerning local housing and transportation, power and water supplies, taxes and labor.

Reduction in Industrial Injuries During 1944

About 2,250,000 persons were disabled during 1944 because of work injuries, according to Secretary of Labor Frances Perkins. The 1944 injuries were about 8 per cent lower than 1943's, so that the upward trend has definitely halted. The actual improvement over 1943 was at least 10,000,000 days, which is equivalent to adding 33,000 full-time workers to the labor forces.

I. I. T. Starts Corrosion Lab

A corrosion research laboratory, under the direction of Dr. Hugh McDonald has been established at Illinois Institute of Technology.

The shortage of materials and the difficulty of replacements have made it evident that the wastage of metals due to corrosion is an important economic and engineering problem.

The purposes of the laboratory, which is the first of its kind in the United States, are to conduct a basic, long-range research program on the fundamental theory of the mechanism of corrosion processes and control, and to serve as a center for graduate instruction in the science and engineering of corrosion.

The laboratory will accept sponsored research projects from industrial organizations which seek aid in the solution of their corrosion difficulties.

Farben Rubber Plant Falls to U. S. Troops

I. G. Farbenindustrie's largest synthetic rubber plant has been captured by American troops. The factory, which was seized undamaged, covers four square miles on the Saale River south of Halle. It had been producing 6,000 metric tons of rubber a month, until the American advance on Leipzig cut off its supply of raw materials.

The plant could resume production on an hour's notice if supplies were provided, according to the director of the factory, who was found hiding on the property.

WPB Plans Increased Carbon Black Production

Fourteen steps designed to increase the production of carbon black, essential to the greatly expanded rubber program, have been announced by the War Production Board. The program has been facilitated through the Inter-Agency Carbon Black Committee whose chairman is Michael J. Deutch.

The committee, appointed March 10, 1945, as directed by James F. Byrnes, Director of War Mobilization and Reconversion, is composed of representatives of the War Production Board, War Department, Navy Department, War Manpower Commission, Petroleum Administration for War, Defense Plant Corporation, Defense Supplies Corporation, Office of Price Administration, Rubber Reserve Corporation and Foreign Economic Administration.

Sugar Foundation Sponsors Research

Six grants to scientists for research into new industrial and nutritional uses for sugar, have been announced by the Sugar Research Foundation, an association of growers and processors of cane and beet sugar. The awards amount to $45,400, bringing to more than $300,000 the total funds which the Foundation has made available.

Industry to Raise $500,000 For Library

A campaign has been initiated by important members of the chemical and pharmaceutical industries to raise contributions of $500,000 for expansion of the

Fraser and LaQue to Head New Sections Created by Inco Development and Research Division

O. B. J. Fraser (left) and F. L. LaQue have been named to direct the recently formed industrial chemicals section and corrosion engineering section, respectively, in the development and research division of The International Nickel Co., Inc. Mr. Fraser, who has directed Inco's investigational work at Mellon Institute, will continue as director of technical service of mill products. Since April of 1940, Mr. LaQue has been engaged in development activities on applications of ferrous and non-ferrous nickel-containing alloys.

library of the New York Academy of Medicine. The committee, headed by chairman C. H. Palmer, of E. R. Squibb & Sons, includes W. B. Bell, president of the American Cyanamid Co.; John L. Johnston, president of the Lambert Co.; John L. Smith, vice-president of Charles Pfizer & Co.; Dr. Marvin Thompson, president of William R. Warner & Co.; George Van Gorder, executive vice-president of McKesson & Robbins, Inc.; Lee H. Bristol, vice-president of Bristol-Meyers Co., and Dr. Theodore G. Klumpp, president of Winthrop Chemical Co.

Pings Directs Little's Organic Lab

Dr. W. B. Pings has recently joined the staff of Arthur D. Little, Inc., where he is director of the organic research laboratory. Dr. Pings was formerly employed at E. I. du Pont de Nemours & Co., where he was engaged in work primarily in the field of petroleum chemicals, dry cleaning aids, polymer-coated fabrics, and synthetic fibres.

National Research Board Established

Establishment of the Research Board for National Security, by the National Academy of Sciences, has recently been announced in a joint statement by Henry L Stimson, Secretary of War; James Forrestal, Secretary of the Navy, and Dr. Frank B. Jewett, president of the Academy.

The objective of the board will be to continue cooperation between civilian scientists and the armed services, pending final consideration by Congress of the bill (S. 825) introduced by Senator Harry Byrd (Dem., Va.) for the establishment by law of an independent agency. The board will assist in providing for continued civilian participation in the longer term scientific problems of national security when the Office of Scientific Research and Development, as a wartime agency, proceeds to liquidate its activities.

Board members, who will serve without compensation, have been selected from the Army, the Navy, industry, and the fields of engineering and medicine.

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Roger Adams
University of Illinois
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College of Physicians and Surgeons, Columbia University
Brig. Gen. W. A. Borden
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Assistant Chief of Staff, Readiness, Cominch.
Rear Admiral George F. Hussey, Jr.
Chief, Bureau of Ordnance
Rear Admiral DeWitt C. Ransey
Chief, Bureau of Aeronautics

Van Pelt Joins Battelle

Dr. J. R. Van Pelt, Jr., known for his educational pioneering, and until recently technical director of the Museum of Science and Industry, in Chicago, has joined the staff of Battelle Memorial Institute, Columbus, Ohio. Dr. Van Pelt will head Battelle's program of research education.

Stauffer Increases Production Facilities

The Stauffer Chemical Co. began production in its new $800,000 carbon bisulfide plant at Bentonville, Va., around April 1, according to James W. Pendorf, plant manager. Output will go primarily in the manufacture of rayon for tire cord.

Manganese Sought From U. S. S. R.

Chemical grades of manganese ore, used as an oxidizing agent in the manufacture of hydroquinone, will soon be sought from the Soviet Union as a means of piecing out the raw material available from domestic sources, the War Production Board recently told its newly created Hydroquinoine Industry Advisory Committee, WPB has reported.

Imports of the ore will be necessary because of the drain on present hydroquione supplies resulting from increased rubber programs and increased requirements for chemical warfare smoke dyes for screening, WPB told the committee.

Members of the industry advisory committee are:

H. W. Dingee, Zinsser & Co., Hastings-on-Hudson, N. Y.; Henry Ford, Tennessee Eastman Corp., Kingsport, Tenn.; Kenneth T. King, Fine Chemicals Division, E. I. DuPont de Nemours & Co., Inc., Wilmington, Del.; C. A. Mazzuchelli, Carus Chemical Co., LaSalle, Ill.; and Franklin H. Stafford, Verona Chemical Co., Newark, N. J.

Chlorine in Demand

Estimated production of 345,800 tons of chlorine during the second quarter of 1945 already has been allotted against requests for 380,870 tons during the quarter, the Chemicals Bureau of the War Production Board told the Chlorine-Alkali Industry Advisory Committee at a recent meeting.

The difference between the chlorine requested and production is about 10,000 tons greater than normal, as a result of increased military requirements, WPB officials told the committee.

The soda ash section of the committee said that it would make arrangements with the industry to provide 195,000 additional tons for the year to cover increased requirements for alumina production.

No Civilian Phthalic

Members of the Dyestuff Manufacturers Industry Advisory Committee have urged the War Production Board to increase their quarterly allocation of phthalic anhydride by approximately 375,000 pounds, in order that military and essential civilian requirements for dyestuffs may be met, WPB has said. Supplies of this critical chemical are exceedingly short, and, as its use for dye production is now confined to military orders only, none will be available for civilian use, officials said.

Military requirements for phthalic anhydride for dye production are about four per cent below actual needs as reported, since military colors require a higher phthalic content, members of the Advisory Committee pointed out at a recent meeting here.

The dye industry needs 14,000,000 pounds, according to estimates by industry members. Since the total April allocation of this chemical for dyes is limited to 980,000 pounds, and designated solely for military uses, members said other intermediates would have to be used for producing dyes for civilian uses, and adjustments in manufacturing processes would be required, causing a delay of four to six months in production.

Caustic Potash Allocation Unnecessary

Members of the newly-formed Caustic Potash Manufacturers Industry Committee have advised the War Production Board that allocation of caustic potash is not necessary at this time, WPB's Chemicals Bureau reported last month.

The committee was asked to consider the feasibility of allocation, or some form of distribution control, after a Chemicals Bureau survey had indicated that supplies probably would fall short of requirements because of increasing demands WPB said.

Membership of this committee is as

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follows: A. B. Chadwich, executive vice president, Solvay Sales Corp., 40 Rector Street, New York City; E. C. Speiden, vice president, Isco Chemical Division, Innis, Speiden & Co., Niagara Falls, N. Y.; S. W. Jacobs, vice president, Niagara Alkali Co., 60 East Forty-Second Street, New York City; Louis Neuberg, vice president, Westvaco Chlorine Products Co., 405 Lexington Avenue, New York City; C. D. O'Dell, sales manager, Dow Chemical Co., Great Western Division, 310 Sansome Street, San Francisco, Calif.

Lime Supply Critical

The Lime Industry Advisory Committee believes that the current critical supply situation can be corrected without resorting to the allocation of lime, if the cooperation of the consuming industries is secured, the War Production Board has reported.

To avert allocation action by WPB, members said, the immediate cooperation of industries using lime is essential.

Furniture Chemicals Scarce

Continuing tightness of the supply of hydrogen peroxide and glues for furniture manufacture was reported by War Production Board officials at the recent meeting of the Wood Furniture Industry Advisory Committee, WPB said recently.

Beginning May 1, WPB representatives reported, total production of hydrogen peroxide will be needed to meet military requirements.

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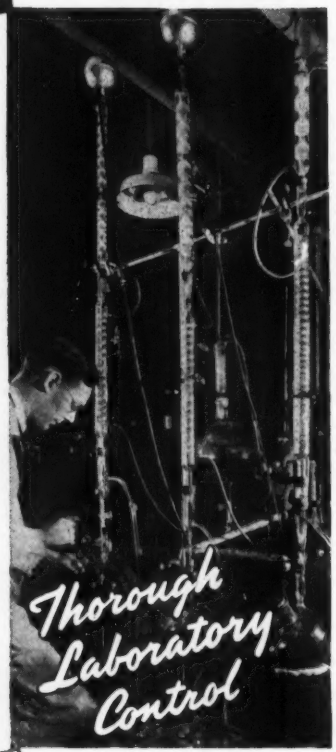

The new Edwal Catalog and Price List No. 8-C (dated May, 1945) listing many new chemicals is now ready. Write for it today.

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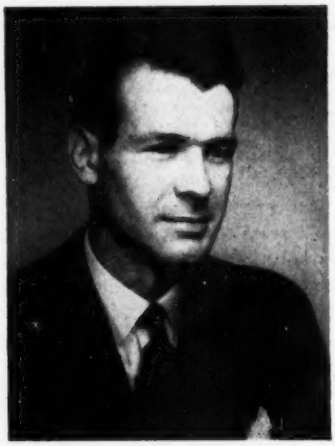
Penn Salt Appoints Duffy to Sales Post



The appointment of J. J. Duffy, Jr., as assistant manager of sales of the Pennsylvania Salt Manufacturing Co., Philadelphia, Pennsylvania, has been announced by Mr. George B. Beitzel, vice-president in charge of sales. Mr. Duffy has been associated with the company since 1937. In his new capacity, he will assist W. P. Drake, manager of sales, in supervising the activities of the special chemicals division field men.

CALENDAR *of* EVENTS

Scheduled

POLYTECHNIC INSTITUTE OF BROOKLYN, THE SOCIETY OF RHEOLOGY, and the *METROPOLITAN SECTION OF THE AMERICAN PHYSICAL SOCIETY,* one day conference on "The Ultracentrifuge in Highpolymer Research," at the Polytechnic Institute, Saturday, June 2nd.

CANADIAN CHEMICAL CONFERENCE for 1945 on the theme "Coordination of Chemical Research and the National Welfare," Quebec City, June 4, 5, 6.

Postponed

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, regional meeting of chemical engineers at Houston, Texas, April 2 and 3 has been postponed until fall.

Cancelled

AMERICAN CHEMICAL SOCIETY, national meeting in Chicago, September 9 to 14.

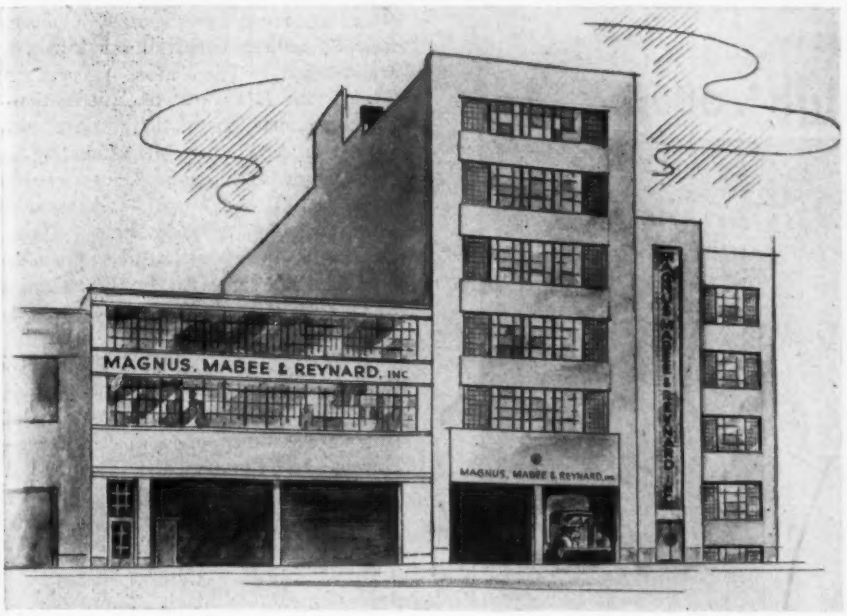
AMERICAN OIL CHEMISTS SOCIETY, 36th annual meeting, New Orleans, May 9 to 11.

COMPANIES

U. S. Vanadium Corp. Forms New Division

Announcement was made today by J. R. Van Fleet, president of United States Vanadium Corp., a unit of Union Carbide and Carbon Corporation, of the formation of a new division to be known as the Metal Chemicals Division. This division will manufacture and market inorganic compounds of certain metals including tungsten, molybdenum, vanadium and others in the industrial field.

J. A. Holliday has been elected a vice-president and has assumed charge of this



With the completion of another building to house their expanded manufacturing facilities, Magnus, Mabee & Reynard celebrates 50 years of service to industry. The new annex is a step in the firm's expansion program. The new 5-story building, which adjoins the firm's present quarters, adds over 20,000 square feet of space.

division. Production and sales will be under the direction of A. J. Gailey, manager. Mr. Holliday's headquarters will be at 30 E. 42nd St., New York. Mr. Gailey's headquarters address is Post Office Box 519, Niagara Falls, N. Y.

Nat'l Research Corp. Starts MIT Fellowship

The National Research Corp., Boston, Mass., has established a graduate fellowship at the Massachusetts Institute of Technology for an American student undertaking research in the field of high vacuum. The initial grant is $2,500.

It is hoped that this award will foster interest in, and the development of, new processes performed under high vacuum (pressures in the range of 10^{-7} to 1 mm. of Hg) in the fields of chemistry, physics, metallurgy and engineering.

New Plant to Produce Phthalic Anhydride

The Oronite Chemical Co. has announced that production of phthalic anhydride will begin in June at its new plant at Richmond, Calif. The plant, which will have a capacity of 7,000,000 tons annually, will use ortho-xylene instead of naphthalene as the basic material for the anhydride. Constructed with company funds, it is the only such plant west of St. Louis.

Ohio-Apex Undertakes Research

Ohio-Apex, Inc., Nitro, West Virginia, manufacturers of plasticizers and chemicals, has completed contract arrangements with Battelle Institute, Columbus, Ohio, for an extensive program of research on the development of new synthetic organic compounds. The research, to begin immediately, will embrace thorough literature surveys and laboratory investigations in newly tapped fields of organic synthesis.

Harshaw Builds New Ore Smelter

The Harshaw Chemical Company with headquarters in Cleveland, Ohio, has authorized the construction of a new antimony smelter and oxide plant at their El Segundo, California, works.

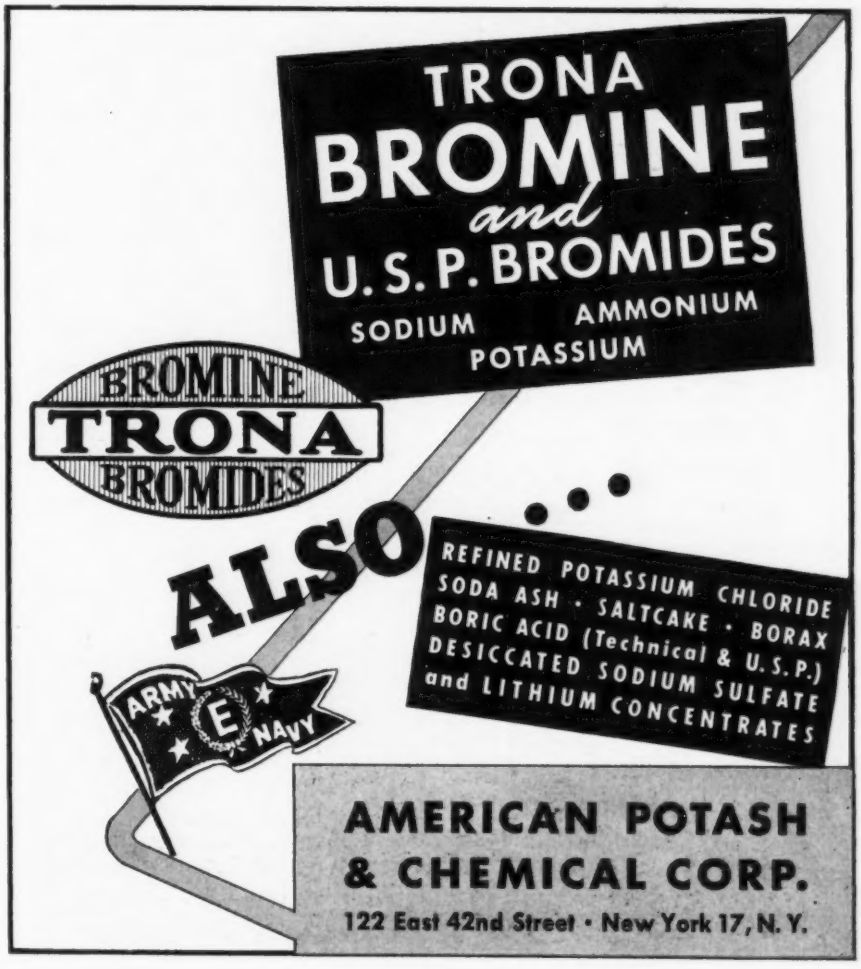
The plant is now being designed and construction has been started. R. A. Lucht, assistant chief engineer, is acting as technical adviser, with Harold B. Menardi, manager of the local division of the company in direct charge of the project. Construction is expected to be completed in July this year.

New Plastics Co.

The Furane Plastics and Chemicals Co. established its office and manufacturing plant at 5233 West San Fernando Road, Los Angeles 26, California, on March 1, 1945. This company has been organized to produce plastics materials and various chemicals derived from furfural. Initial production will be devoted to the preparation of high strength, cold setting adhesives for plastics and rubber products.

I. T. & T. Forms Scientific Unit

Electronic scientists of International Telephone & Telegraph Corp., in this and



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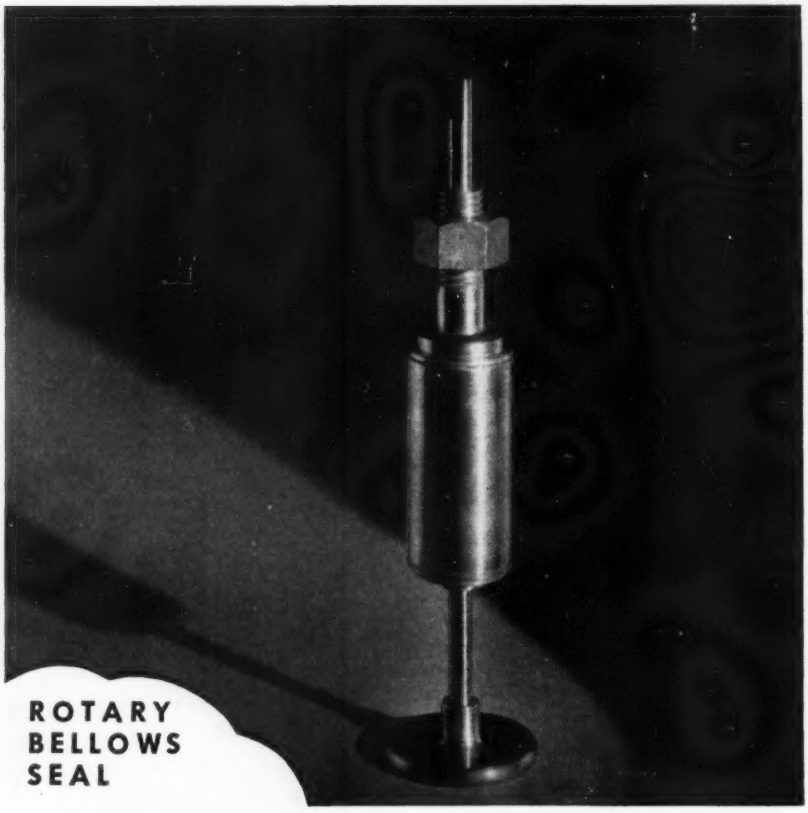

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other countries, have created a world-wide $2 million cooperative information organization. The new corporation, formed in Delaware as International Telecommunication Laboratories, was formed to make possible ultimately an exchange of inventions and closer coordination of I. T. & T.'s world-wide research work, including advances in radio, television and other branches of communications and the aids to aerial navigation which they will provide in the post-war era.

E. M. Deloraine, general director of Federal Telephone & Radio Laboratories, New York, has been chosen president. Among the other officers elected were Harold H. Buttner and Douglas B. Baker, vice-presidents; Paul F. Swantee, comptroller; O. C. Buchanan, treasurer, and C. Douglas Webb, secretary.

Guthmann Returns to Edwal

Concluding 3½ years in the Technical Division of the Chemical Warfare Service, Major W. S. Guthmann has resumed his former position as vice-president and treasurer of the Edwal Laboratories, Chicago.

Company Notes

AGAR & CHEMICAL PRODUCTS COMPANY, INC., has been organized in Los Angeles with a capital of $75,000. Directors are: J. A. S. Furlonge, David W. Ramont and Raymond E. Ramont, all of Los Angeles.

MICHIGAN CHEMICAL CORP. has announced the removal of its eastern sales office from 15 Exchange Pl., Jersey City, N. J., to 70 East 45th St., New York. The manager, P. J. Lo Bue, was former president of the Salesmen's Association of the American Chemical Industry.

STANDARD CHEMICAL COMPANY, Akron, Ohio, has opened a New England sales office in 335 Chamber of Commerce building, Boston, under the management of C. A. Meyer.

INTERNATIONAL MINERALS & CHEMICAL CORP. is making plans for a new plant on the Pacific Coast to be built as soon as equipment is available. The plant will make monosodium glutamate and glutamic acid hydrochloride.

ASSOCIATIONS

Cereal Chemists Honor Dr. Baker

Due to the cancellation of the annual meeting of the American Association of Cereal Chemists which was originally scheduled for Toronto, Canada, the New York Section of the A. A. C. C. will sponsor a special dinner meeting at which the Thomas Burr Osborne Medal will be awarded to Dr. John C. Baker, Wallace & Tiernan Company, Inc.

Fertilizer Ass'n Elects Murph

The National Fertilizer Association has chosen D. S. Murph to act as executive secretary and treasurer on the retirement of Charles Brand. Mr. Murph, who has been administrative assistant for eleven years, will serve until a permanent successor to Mr. Brand is elected.

Trenton Technical Society Organized

Formation of the Trenton Technical Society, an organization open to those engaged in various scientific fields in the Trenton, New Jersey, area, took place on April 3, it was announced by Gerald P. Roeser, Thiokol Corporation, who was elected president of the group. Attending the initial gathering were 52 representatives from 18 companies located in the vicinity of Trenton. N. R. Yorke of the Panelyte Company was named vice-president, and Newell Perry of Thermoid Company was selected secretary-treasurer.

Classified Directory of Chemists

The Association of Consulting Chemists and Chemical Engineers, Inc., has published the ninth (1945) edition of the Classified Directory. Modernized as to layout, the book contains 180 pages.

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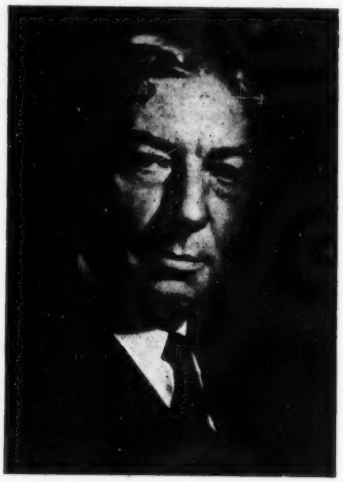
PERSONNEL

Barrett Promotes Colvin, Marsden and Mortimer

The Barrett division of the Allied Chemical & Dye Corporation has appointed Roy S. Marsden manager of nitrate sales. William H. Mortimer has been made manager of ammonia sulphate sales. Walter S. Colvin has been named New York district sales manager.

Surface to Assist Standard Oil President



Dr. Frank M. Surface has been named executive assistant to the president of the Standard Oil Co. of New Jersey. He has been coordinator of sales research for the company since 1943.

Collyer Chooses Trainer To Assist Rubber Program

J. Edward Trainer has been appointed assistant to John L. Collyer, special director of rubber program of the War Production Board. Mr. Trainer, vice-president in charge of production for the past seven years at Firestone Tire & Rubber Co. is on loan for a limited period.

American Potash Names Kolb Sales Manager

Edward M. Kolb has been named general sales manager of the American Potash & Chemical Corp.

Mr. Kolb became associated with the company in February of 1932.

Irwin Becomes Consultant

James W. Irwin has formed a management consultant firm with offices in the Empire State building, New York. He was formerly with the Monsanto Chemical Company, St. Louis.

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Minnesota Mining Expands

Resumption of its pre-Pearl Harbor expansion program will be undertaken by Minnesota Mining and Manufacturing Company, St. Paul, in the immediate postwar period with construction of a new 400,000 square foot scotch tape addition to its St. Paul plant and a color quartz roofing granules plant in the South.

Announcement of these plans was made this week by W. L. McKnight, president, on behalf of the board of directors of 3-M Company. The announcement came hard on the heels of an announcement last week that a Minnesota Mining and Manufacturing Company subsidiary, the Inland Rubber Corporation of Chicago, has been authorized by the government to build and operate a $7,000,000 plant at Ottawa, Illinois, in the government's latest step to help meet the shortage of military tires.

The additions, including equipment, are estimated to cost some $4,000,000, and funds have been earmarked to carry these projects to completion as soon as wartime restrictions on material and manpower are lifted. Approximately $2,500,000 is to go into the St. Paul plant. These expansions are part of a 3-M Company growth program which was in progress when the United States entered the war, and resumption of which is a major postwar aim of the company.

Monsanto to Sell DDT as "Santobane"

Monsanto Chemical Company has announced that in the future it will sell DDT under the trade name of Santobane.

If formulations of Santobane are produced, the company said, the same term will be used, and with it an identifying letter or number. Monsanto now makes only the basic chemical, which, for effective use against insect life, must be properly dispersed as a spray or dusting formulation.

Volume production of the insecticide was begun by Monsanto last September, with virtually the entire output going to meet military requirements.

C. P. Hall Opens Chicago Plant

Looking forward to possible further decentralization of the rubber industry, The C. P. Hall Co. of Illinois recently opened a new chemical plant in Chicago to serve the midwestern and southern United States.

The modern facilities have been built to handle annually more than two million dollars' worth of chemical supplies needed by the rubber product manufacturers. The plant is located on Chicago's southwest side.

Plasticizers and chemical softeners will be the principal products in the Chicago plant, Sam A. Davis, vice-president of the Illinois concern, explained. Additionally, 10,000 square feet of warehouse floor space will be used to store and ship all other chemicals needed in building tires, rubber assault boats and similar rubber war materials, he said.

Initial production of the plasticizers has been placed at 100,000 gallons a month. Average production is expected to reach 250,000 gallons monthly, and capacity production is estimated at 350,000 gallons of chemicals a month. The warehouse will handle one million dollars' worth of business annually, Mr. Davis predicted. Factory, warehouse and office occupy 53,000 square feet of land.

Address of the Chicago plant is 5145 West 67th Street.

Minnesota Mining Promotes Pesek

Appointment of C. P. Pesek, Minneapolis, as administrator of engineering of Minnesota Mining and Manufacturing Company, St. Paul, is announced by R. P. Carlton, vice-president in charge of manufacturing. Mr. Pesek has been with 3-M Company since January 10, 1944, preparing plans for expansion of the plant.

A. H. P. Plans Large Postwar Expansion

A postwar expansion program costing in the neighborhood of $15,000,000 was indicated by Alvin G. Brush, chairman of the board of American Home Products Corporation, in connection with the issuance of the Corporation's annual report.

Plant and laboratory expansion will be started as soon as war restrictions are relaxed.

Druggists Offer Fellowships

Packaging and job evaluation problems will be studied at recognized schools of business under fellowships offered by the National Wholesale Druggists' Association, Dr. E. L. Newcomb, executive vice-president of the association, announced recently.

Valued at $1,500 each, the fellowships will provide graduate work for one or two years, and may be carried for a third year if results justify, Dr. Newcomb said.

General Printing Ink Opens Western Division

A West Coast division with headquarters in San Francisco has been opened by General Printing Ink Corp.

The division, of which William J. Egan will be general manager, will coordinate activities formerly handled by the three divisions of the corporation: The Fuchs & Lang Manufacturing Company, The George H. Morrill Company and the Sigmund Ullman Company.

Sales Agent Appointed

Allied Asphalt & Mineral Corp. announce the appointment as Sales Agent, Conant Company, Ltd., 3975 St. Ambroise St., Montreal, Que., Canada.

U. S. I. Acquires PiB Chemical Co.

L. A. Keane, vice president of U. S. Industrial Chemicals, Inc., has announced that his company has acquired the exclusive manufacturing and sales rights of the PiB Chemical Company, makers of PiB liquid insulation.

Essential Oil Company Formed

The Noville Essential Oil Co., which will import and manufacture essential oils, perfume specialties, and aromatic chemicals, has been founded in New York by A. G. Nickstadt and A. H. Moeller. Mr. Nickstadt is president of the Noville Products Co., New York, and Mr. Moeller has been with the aromatics division of the Du Pont Company.

Oil Trades Association Elects Officers

Officers were elected at a recent annual meeting of the Oil Trades Association of New York. They are as follows: president, K. L. Patterson, of Stanco Distributors, Inc.; vice-president, J. L. Blak-

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CALCIUM IODOBEHENATE, U. S. P.
CALCIUM LEVULINATE, pure
CAMPHOSULFONATES
CAMPHORIC ACID, C. P.
ETHYL CHAULMOOGRATE, U. S. P.
HELMITOL, N. N. R.
HEXAMETHYL — DIAMINO-ISOPROPANOL-DI-IODIDE Quaternary Ammonium Compound (chemical name for Endoiodin and Iodisan)
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Whiting
Magnesium Carbonate
Magnesium Oxide
Precipitated Chalk

Anti-Freeze—Methanol and Alcohol

ney, of Colgate, Palmolive, Peet Company; secretary, Joseph C. Smith, of Smith-Weihman Company, Inc.; and treasurer, J. S. Renick, of Renick & Mahoney, Inc.

Drug Firms Announce Personnel Changes

Whitehall Pharmacal Co. has named E. L. Bernegger sales manager in charge of wholesale and retail sales. Ira D. Joel was named director of chain store sales. Whitehall is a subsidiary of American Home Products Corporation.

McKesson & Robbins, Inc., has appointed Lieut.-Col. H. V. Phillips to the newly created post of merchandising manager for the manufacturing division. He has been on leave of absence for the past three years to serve with the Army Air Forces.

Maltbie Chemical Elects Officers

In a recent meeting of the board of directors, Dr. R. J. Fosbinder, technical director of the Maltbie Chemical Co., pharmaceutical manufacturers of Newark, N J., was elected president to succeed the late Clarence W. Warner.

Other officers elected by the board of directors in a recent meeting are: Chairman of the board, J. H. Foy; vice-president in charge of sales, W. J. Burke; vice-president in charge of advertising, P. J. Blakeslee; vice-president in charge of manufacturing, V. O. Mattson; secretary and treasurer, H. W. Crogan.

Wells Named by Stearns

Dr. Eugene H. Wells, formerly of the U. S. Food and Drug Administration, has been appointed director in charge of chemical and biological control of the Frederick Stearns & Company Division, Sterling Drug Inc., Detroit, Mich.

Reed Succeeds McDonnell

Dr. Curtis C. McDonnell, veteran head of Federal Insecticide Act enforcement, has retired and been succeeded by Dr. W. G. Reed.

Dr. Reed entered the U. S. Department of Agriculture in 1929. Since 1931 he has been serving in important technical and administrative posts in the USDA's meat inspection service. As Dr. McDonnell's successor he becomes chief of the Insecticide Division, Livestock and Meats Branch, Office of Marketing Services, USDA. Dr. McDonnell joined the USDA in 1907 as assistant chemist in the Bureau of Chemistry. He became chief of the Insecticide Division in 1928.

Cowles Appoints Wall and Ozar

The Cowles Detergent Company, Cleveland, Ohio, has announced the appointment of Henry G. Wall, 128 Westminster Street, Buffalo, New York, to handle the technical service work for its Metal Cleaner Department in New York state. Mr. Wall was recently honorably discharged from the Army. He has covered the New York State industrial field for many years as a technical engineer on surface coatings and finishes.

At the same time the company announced the appointment of Clarence G. Ozar to the staff of its Metal Cleaner Service Laboratory. Mr. Ozar received his degree in chemistry from the University in Detroit.

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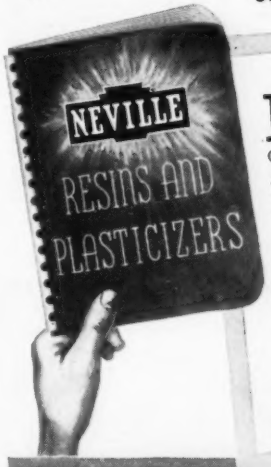
Your Guide...
TO THE NEVILLE LINE
of Resins and Plasticizing Oils



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WAR REGULATIONS SUMMARY

AMYL ALCOHOL AND ACETATE—(WPB) Schedule 100 of the general chemicals order, M-300, places amyl alcohol and amyl acetate under allocation. The small-order exemption per person per month is 34 pounds of the alcohol and acetate in aggregate.

ANTIMONY—(WPB) The small-order exemption for antimony was slashed 90 per cent, from 2,240 to 224 pounds.

CADMIUM—(WPB) Further restrictions have been placed on the use of cadmium. Amended Conservation Order M-65 provides that all purchasers must certify that the metal will be used for permitted purposes. This also applies to those purchasing under the 100-pound small-order exemption.

CARBON TETRACHLORIDE—(WPB) Customers ordering more than 3,500 pounds of carbon tetrachloride per month are now listed by suppliers. Previously this requirement only applied to those using over 7,000 pounds.

COPAL GUM—(OPA) Amendment No. 2 to Maximum Price Regulation 297 brings Congo copal gum bought in the Belgian Congo under a buying ceiling. Domestic ceilings were increased at the same time to restore the March 1942 profit margin.

ESTER GUM—(WPB) This has been placed under Order M-340.

FREON-12—(WPB) Restrictions on delivery and use of Freon-12 (difluorodichloromethane) for air conditioning and certain types of refrigerating systems were removed by an amendment to Order M-28.

GELATIN—(OPA) Producers of wet gelatin raw stock who made no sale of the product as such in 1942 will be permitted to sell through dealers without special authorization.

HYDROQUINONE—(WPB) Schedule 101 of Order M-300 places hydroquinone under allocation control. The usual forms must be complied with except for the individual small-order exemption of 400 pounds per month.

LEAD—(WPB) Permitted uses of the metal have been curtailed by amendment to Order M-38.

NICOTINIC ACID — (WPB) Control over this vitamin was suspended by revocation of Schedule 1 to Order M-300.

PARADICHLOROBENZENE — (WPB) Placed under Order M-340.

PHTHALIC ALKYD RESINS—(WPB) Amendment of Schedule 59 of Order M-300 provides measures to conserve phthalic alkyd resins. It limits the amount that can be used on certain army specification coatings and requires substitution of other types in some instances where the facilities of the manufacturers allow.

PIGMENTS—(WPB) Titanium dioxide and zinc sulfide have been placed under M-340. Limitation Order M-353, under which these materials were previously allotted, has been revoked.

POTASSIUM SALTS—(WPB) All primary potash salts have been removed from Order M-291 and placed under Schedule 98 of M-300.

STEEL—(WPB) Use of steel for maintenance, repair, and operating supplies for the chemical industry has been limited in the second quarter to 80 per cent of the quantity used in the corresponding period in 1944.

TALC—(WPB) Amendment to Order M-239 establishes a "preferred order" preference rating for talc uses. These take precedence over all numbers except the AAA emergency rating.

UREA AND MELAMINE RESINS—(WPB) Inflated requests will be curbed by making it necessary for users to apply for resins on Form WPB-2945 instead of filing purchase order certificates according to an amendment to Schedule 34 of Order M-300.

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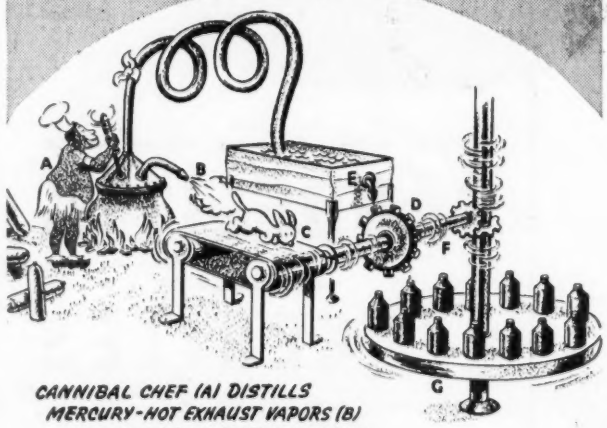

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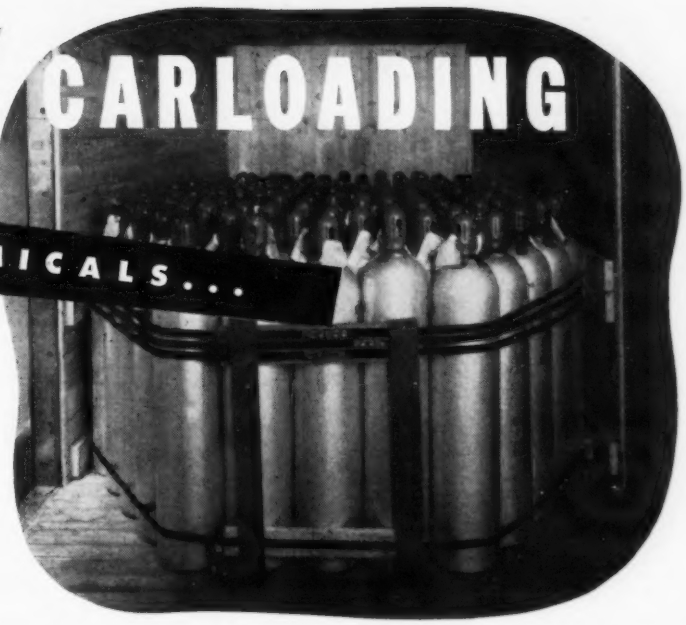

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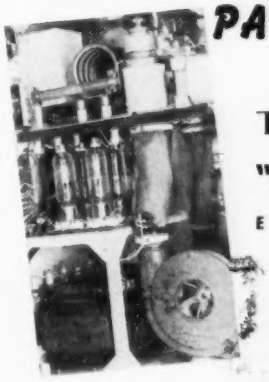

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CANADIAN NEWS

by W. A. JORDAN

Alberta Nitrogen Production Doubled

ONE of the major chemical developments in Canada during the war years has been the creation of extensive facilities for the production of synthetic ammonia and ammonium nitrate, complete detailing of which has been prohibited heretofore by security regulations. However, a number of features of the largest single unit constructed, and one often referred to as the world's lowest cost producer, have been revealed recently by J. R. Donald, director-general, chemicals and explosives, Department of Munitions.

According to Mr. Donald, the $10 million, Crown-financed, Alberta Nitrogen Products Ltd., Calgary, has been expanded from 100 tons of ammonia per day to 230 tons per day capacity, and additional equipment has been installed to convert 75 tons of that output to ammonium nitrate. When operating at full capacity this plant consumes 9 million cubic feet of natural gas daily, which amounts to some 20 per cent of the total gas demand of the entire Calgary district.

Although Alberta Nitrogen was constructed initially for the manufacture of explosive grade ammonium nitrate, much of its output is now in the form of fertilizer nitrate, of which the Dominion exports, in all, some 150,000 tons annually.

In his testimony before the natural gas hearing, in Calgary, Mr. Donald stated that this ammonia plant could, and should, be a valuable peacetime asset, provided basic natural gas costs were maintained. Any increase in such costs would naturally be reflected directly in the cost of ammonium nitrate and determine the plant's ability to compete in the export market, on which its future, long-term functioning must depend, in view of Canada's limited normal demand for nitrogen.

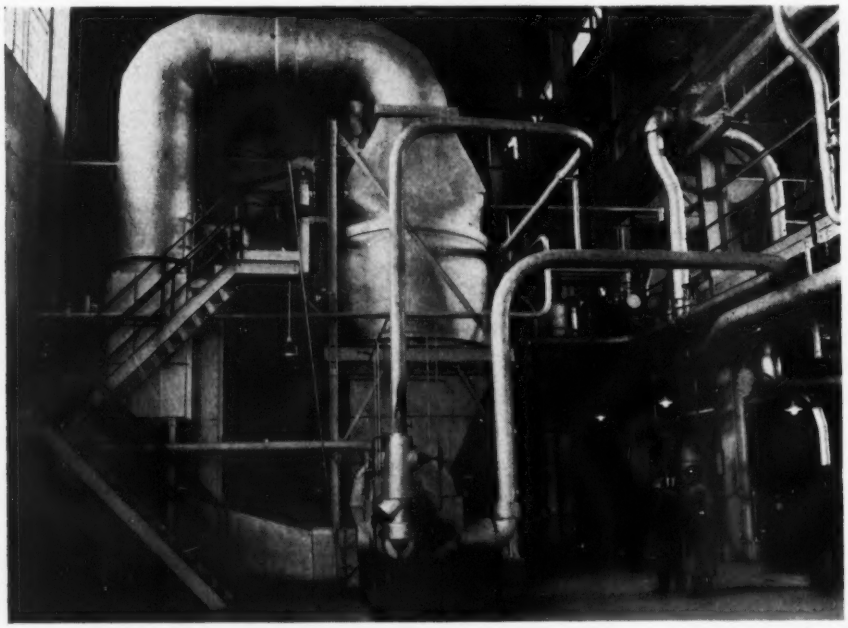
Carbon Black Unit Under Consideration

Plans for the construction of a carbon black producing unit in Canada are under serious consideration at the present time, and although it may not be said that such a project will be undertaken, it does stand as a distinct possibility at the moment. If detailed analyses prove the economics to be sound, such a plant will be erected in the Calgary area, based on abundant Turner Valley natural gas.

At present the Dominion is entirely dependent on the United States for all carbon black supplies—other than acetylene black—of both the channel and furnace types, and with the overall short supply position in the United States, the Canadian allocation is equally stringent. In fact, in the light of the existing supply emergency it was deemed probable a short time ago that a Government-financed unit might be erected, but such a probability is now discounted, and any such venture will be privately financed, for long term operation.

Although the last official figures available place Canadian imports of carbon black from the United States at 28 million pounds (1943), the increased need of synthetic rubber processors has bolstered consuming demand by at least an additional twenty percent. Furthermore, planned expansion of rubber processing facilities indicates still larger future demand.

One consideration of moment, however, is the long freight haul from western Canada's Turner Valley to the carbon black consuming eastern Canada. Nevertheless, it is pointed out that under present conditions Canada is served by remote Texas and Louisiana, and the question of substance is whether base costs of a smaller-scale Canadian unit would render it competitive, under normal circumstances, in Canada's eastern market.



A scene in the plant of Alberta Nitrogen Products, Ltd., at Calgary

Howard Smith Reclaims Lignin from SO_4 Liquor

Howard Smith Chemicals, Ltd., Canadian pioneer in lignin research, has brought into production at its Cornwall, Ontario, mill, the Dominion's first unit devoted to the reclamation of lignin from sulfate liquor.

Although complete details as to the process employed and physical properties of the product have not as yet been released, it is understood that in general the method embodies precipitation of the lignin from the residual liquor by a relatively simple means, and its subsequent deposition on the pulp in the paper making machine. This yields a light brown "paper," sheets of which may be stacked, and with the application of moderate heat and pressure produces a tough, glossy, laminate.

Initial output of this new product, which is claimed to be superior in some respects to several types of lignin laminates manufactured by other processes, or from sulfite liquor, will be mainly in the manufacture of large objects, such as "boards" for construction and interior decoration purposes.

Shawinigan to Expand

Shawinigan Chemicals, Ltd., producer of some $20 million per annum of calcium carbide and carbide-based chemicals, plans extensions to its Shawinigan Falls plants involving an expenditure of $2.8 million this year, according to official advice.

A substantial proportion of this total allocation will be invested in the construction and equipping of the subsidiary Canadian Resins and Chemicals, Ltd., Vinylite unit, now being built. Completion of this project by Canadian Resins, which is jointly owned by Shawinigan

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In addition the program includes pilot plants for the exploitation of new products and processes which have been developed in the Research Department, with particular attention to be devoted to crotonic acid, and chloral, together with general improvements in carbide plants and certain existing chemical processes.

Consolidated Shows Gains

The annual report of Consolidated Mining and Smelting Co. of Canada, Ltd., as presented by Chairman S. G. Blaylock, reveals that the company's chemical and fertilizer operations broke all previous tonnage records last year.

Sulfuric acid output in 1944, in terms of 100 per cent acid, stood at 331,718 tons, against 269,394 in the previous year, and up a full 137,000 tons over 1942 figures. Thereby, Consolidated's 1944 sulfuric acid output exceeds the Dominion's entire production-for-sale tonnage of 1940.

Total fertilizer tonnage for the year was 327,232 compared with 272,503 in the preceding year, and although raw material costs were higher, production costs are stated to be generally satisfactory. As in the past, the great bulk of the fertilizer production was exported, principally to the United Kingdom, Hawaii, India, New Zealand, Ceylon, and the western United States.

In cooperation with the government, to permit fullest possible utilization of ammonia from Trail and Calgary operations, additions were made by Consolidated to its sulfuric acid, phosphoric acid, ammonium phosphate and ammonium sulfate plants during the year, and in view of decreased market demand, production of mercury at the Pinchi Lake holdings was discontinued.

G. E. Plans Glyptal Increase

Canadian General Electric Co., Ltd., one of Canada's pioneer plastics manufacturers, plans the immediate construction of a $350,000 addition to its Toronto glyptal resin producing facilities.

The new three-story reinforced concrete plant is scheduled to be in full-scale operation by late July and will house an extended research and control laboratory.

Virtually the entire output of the expanded unit will be to meet Canadian market demand.

Cellophane Addition

Canadian Industries, Ltd., Montreal, is extending its cellophane plant at Shawinigan Falls at the request of the government.

Although the building will be comparatively small, costing only about $15,000, the equipment to be installed is valued at about $200,000.

New Match Plant

The Western Match Co. has purchased a 3½ acre factory site at Victoria, B. C., and plans the construction of a $150,000 unit which will employ some 60 persons, according to the Vancouver Board of Trade.

Heretofore, the Canadian match manufacturing industry has been concentrated in Ontario and Quebec, and this factory will be the only one west of Ontario.

Fluorine Experiment

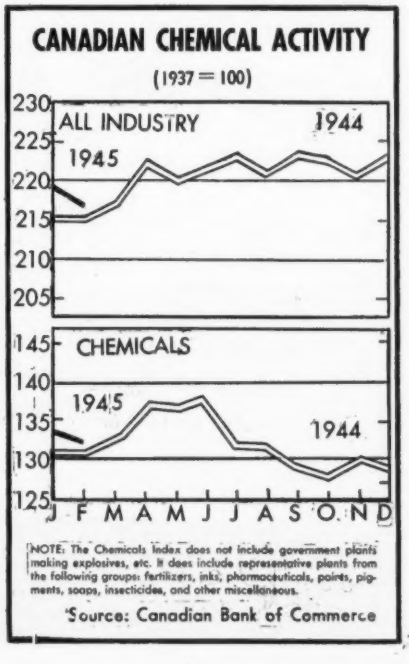
The city of Brantford, Ontario, with a population of 35,000 is to become the first city in Canada to conduct experiments to determine the benefits in dental health to be derived from the addition of fluorine to its water supply.

Based mainly on surveys which have been conducted in the U. S., city authorities have decided to treat the drinking water so that its fluorine content will be 1.05 parts per million. Estimated cost of the experiment is placed at $3,250 per annum or nine cents per capita.

Standard Chemical Stock Split

Standard Chemical Co., Ltd., operator of four hardwood distillation units, and recent purchaser of Goderich Salt Co., Ltd., is effecting a five-for-one split of the present shares and an increase in capital, according to Chairman E. P. Taylor.

The 38,750 shares of no par value will be subdivided into 193,750 shares of no par value and an additional 106,250 shares created to bring the new authorized capital to 300,000 shares, of which 191,385 will be listed.



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Although these cans have been stored outside and the exterior paint appears dull from weathering, they have never been used and have been tested by the Q. M. C. and passed inspection as being in first class serviceable condition. Sample sold on request.

SPECIFICATIONS

Made of heavy 20 gauge steel, approximately 18¼" x 13½" x 6⅝" with 2½ inch screw cap over pouring opening. Solid welded construction. Three bar handles at top of can facilitates carrying for one or two persons. 5 gallon capacity.

COLOR: Deep forest green.

PRICES: In truck trailer loads of 500 or more, or freight carloads of 4000 F.O.B. Columbus, Ohio or Mira Loma, California, each..... **90c**

In lots of 100 or more F.O.B. Columbus or Cincinnati, Ohio or Mira Loma or Los Angeles, California; each..... **$1.10**

TERMS: Net 10 days to rated concerns.

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MODEL JK 2 Station Automatic

VOLUME FILLER & PACKER — GROSS WEIGHER

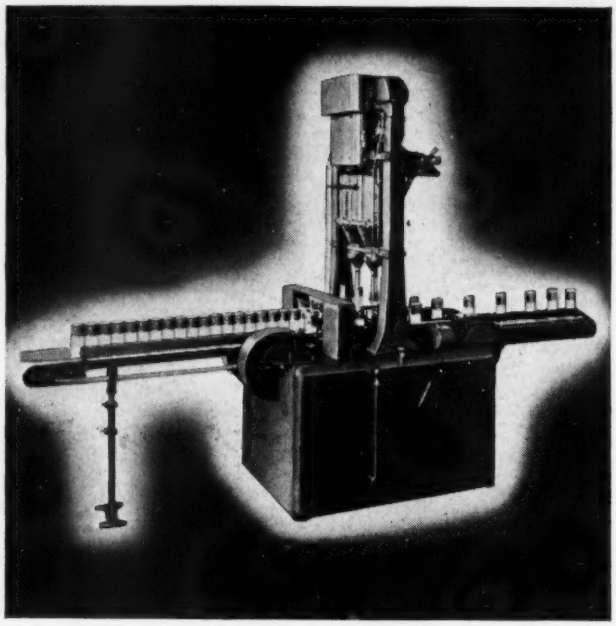
For all types of powdered and granular chemicals

The Model JK is an Automatic Packer that will also operate as a Volume Filler or Gross Weigher. This machine fulfills every requirement for advanced means of automatically handling powdered, granular and paste materials of almost all descriptions.

The Model JK has two filling stations. When the machine is used as an Automatic Volume Packer the empty containers are elevated, causing the actual filling to take place under the amount of controlled pressure suitable for the type of material and the size of container into which it has to be packed. This same principle is used when the machine is equipped as a Packer-Weigher, except that the main portion of the contents is packed under pressure, the remainder finished by weighing for accuracy. When the machine is used as a Volume Filler or Gross Weigher, provision can be made to incorporate a vibrating type of settling device to settle the material after filling.

The machine can be equipped for intermittent conveyor motion to facilitate handling of oval or irregularly shaped containers. With this intermittent motion, the conveyor moves just enough to deliver one container at the transfer station, thus preventing climbing and piling up of the containers.

The many new automatic features, plus the speed and accuracy of the JK, soon pay for the machine through savings on labor costs alone. It will pay to get full details and specifications—there are many features never available before—write today for bulletin which gives complete data on the Model JK!



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Asbestos in 1944

Asbestos is classed as a strategic mineral, and for reasons of security no statistics can be released at this time. The Bureau of Mines continues, however, to compile all available statistical data which will be released at the termination of the present war emergency and will thus preserve the continuity of the statistical records.

Production in the United States was somewhat higher in 1944 than in 1943, but even with this gain domestic sales furnished only 1½ percent of domestic requirements.

Canada as in the past furnished the larger part of United States needs of chrysotile, but much of that supplied by Canada consists of shingle stock, paper stock, and other of the shorter nonspinning grades. Africa supplied a substantial part of the longer grades needed for military and essential civilian applications.

Supply Situation

The general situation improved greatly throughout the year. No serious interruption to imports occurred, and the flow of materials both from Canada and Africa was sufficient to meet all current requirements and to build up a reserve for future commitments.

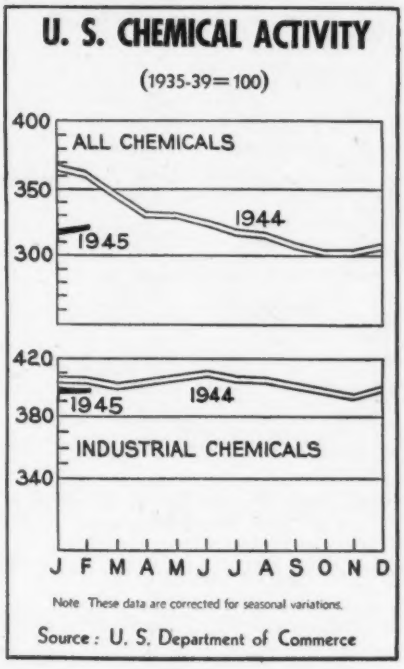
Market trends were generally downward throughout the year. A moderate curtailment in demands for strategic grades in the military program had no compensating increases in other fields because building activity remained at a low level, and there was virtually no increase in the demand for asbestos used in a multiplicity of products that normally satisfy civilian needs.

Zinc Production Lower

The production of zinc (in terms of recoverable metal) from domestic mines in February 1945 calculated from production of zinc concentrates by mills, individual and custom, was 53,188 tons, a decrease of 3,481 tons (6 percent) from the January output, according to preliminary estimates of the Bureau of Mines, United States Department of the Interior. The average daily production in February was 1,900 tons, 72 tons greater than the January average daily production; but 46 tons less than the 1944 average monthly production.

Production from the Central States decreased 679 tons (4 percent) in February, and was 2,735 tons (15 percent) below the 1944 average monthly output of 17,881 tons. Zinc-producing properties of the Eastern States operated at approximately the same rate as in January; the decreased production was due to a shorter operating period in February. The Panaminas, Inc., mill in Virginia ceased operations the latter part of January.

Although zinc production in the combined Western States decreased 1,446 tons, largely due to a shorter operating period in February, a comparison of the average daily production figures in February (890 tons) with January (851 tons) indicates an increased rate of output. The mines of this region produced 47 percent of the United States total recoverable zinc in February.



Sulfur Shipments Up

Production and consumption of native sulfur in January 1945 were maintained at the high levels of previous months according to figures released by the Bureau of Mines, United States Department of the Interior. Mine shipments were higher than in any previous January, and consumers' stocks were reduced by 65,867 long tons.

Production, mine shipments, apparent sales, and producers' stocks of native sulfur in the United States in selected periods, 1943-1944-1945, in long tons.

Period	*Production*	*Mine shipments*	*Apparent sales**	*Producers' stocks***
November 1944	293,551	290,005	314,324	4,089,622
December 1944	280,580	223,268	269,882	4,100,320
January 1945	275,722	321,604	341,589	4,034,453
January 1944	179,226	253,190	281,429	4,360,018
January 1943	231,086	171,755	197,366	5,148,206

*Calculated from production and change in stocks during the period.
**Producers' stocks at mines, in transit, and in warehouses at end of period.

Western Phosphate Production Rises

A new high record for phosphate rock production in the Western States was set in 1944, the marketed production reaching 298,999 long tons (with a P_2O_5 content of 95,767 tons). This was an increase of 13 per cent above the previous high of 1942, and 70,319 tons (31 per cent) more than the quantity sold or used in 1943, according to reports by producers to the Bureau of Mines, United States Department of the Interior. The total value was slightly more than 1⅛ million dollars. The production in 1944 came from Idaho and Montana; Utah was inactive. The average P_2O_5 content of the Western States phosphate rock sold or used in 1944 is reported as 32.02 per cent.

Idaho rock sold or used in 1944 (112,565 long tons with 35,804 tons P_2O_5 content) was still below the record production of 1942 (114,079 tons), although only 1 per cent compared with 5 per cent in 1943. The average P_2O_5 content was 31.80 per cent. The same two companies were active in this State in 1944 as in 1943 and 1942. By far the larger of these, the Anaconda Copper Mining Co., operated its No. 3 mine at Conda, Caribou County. Most of the Conda shipments in 1944 went to Anaconda, Montana, for conversion to superphosphate. Much smaller quantities were used for the manufacture of phosphate chemicals, for direct application to the soil, for stock and poultry feed, and for fertilizer filler. Some was exported for acidulating. The other producer, the Teton Phosphate Co., Boise, Idaho, mined phosphate rock from its Bennington mine in Bear Lake County, near Montpelier. This material was ground in the company plant and sold for direct application to the soil.

Montana was the largest phosphate rock producer of the Western States group in 1944 as in recent years, its lead in phosphate rock sold or used over Idaho increasing to 73,869 long tons. Three mining companies were operating in the State in 1944. The Montana Phosphate Products Co., of Trail, British Columbia, the largest producer in 1944 in the Western States, operated its Anderson, Graveley, and Anaconda mines, and also its leases in Powell County, Montana. Most of

Prepared by G. W. Josephson and N. C. Jensen, under the supervision of Oliver Bowles, Chief, Nonmetal Economics Division, Economics and Statistics Branch.

the mined product was exported to the Consolidated Mining and Smelting Co. at Trail, but a considerable quantity was sold in the United States. The International Minerals and Chemical Corporation, which in 1942 acquired the Federal lease of the Northwestern Improvement Co., St. Paul, Minn., in the Douglas Creek area, Granite County, Montana, carried on considerable development work at the mine in 1944. It mined a few thousand tons of phosphate rock and treated it in a large test mill recently erected at Sherryl, on the Philipsburg branch of the Northern Pacific about 7 miles from the mine, producing a considerable tonnage of higher grade concentrates. No sales or shipments of the material were made, however, in 1944. Lee H. Skeels, trustee for the Soluble Phosphates, Ltd., Maxville, Granite County, Montana, mined a small tonnage at the mine near Maxville in 1944, but made no shipments during the year.

The average value per ton of the Western States phosphate rock sold or used, as reported by producers to the Bureau of Mines, dropped 9 cents from $4.59 in 1943 to $4.50 in 1944. There was an increase of three cents per ton in Idaho, and one cent per ton in Montana.

Superphosphate

January 1945 statistics on superphosphate are based on the reports of 160 plants, of which 157 manufacture normal superphosphate, nine manufacture concentrated superphosphate and seven manufacture wet-base goods. Three plants manufacture concentrated superphosphate exclusively, while 157 produce normal material only, or normal and concentrated or normal and wet-base goods. The statistics include data for all plants, including government owned, known to have facilities for superphosphate manufacture. All quantities are expressed in equivalent short tons, the figures for normal and wet-base goods being shown on a basis of 18 percent A.P.A. (available phosphoric acid), and those for concentrated superphosphate on a basis of 45 percent A.P.A. The statistics pertain only to superphosphate as such, and include no data for superphosphate in dry-base or dry-mixed goods. Figures for receipts of material, shipments, consumption and stocks relate only to plants which actually produce superphosphate. Cases in which book figures differ from actual physical inventory are covered under the heading "Book adjustments," the amount of book excess being indicated by a minus sign (—) and the amount of book deficit by a plus sign (+). The use of this device makes possible a full accounting of all quantities of each type of superphosphate.

Table 2 shows statistics on the production, disposition and stocks of the three types of superphosphate for each month of 1944 and yearly totals for the United States. The monthly statistics contain all revised figures which were

Table 1—Superphosphate: Production, Receipts, Disposition, and Stocks, by Type, January, 1945
(In short tons—2,000 pounds)

Item	*Normal 18% APA*	*Concentrated 45% APA*	*Wet-base goods 18% APA*
January 1945			
Stocks on hand, beginning of month	793,595	32,488	13,106
Production	623,321	18,103	4,302
Received from other acidulators (inc. exchange transfers)	12,364	....	....
Book adjustments (account of inventory)	+2,094	....	....
Total supply	1,431,374	50,591	17,408
Disposition, total	577,143	25,771	4,114
Shipments, total	340,120	25,634	3,441
Used in reporting plants	237,023	137	673
Stocks on hand, end of month	854,231	24,820	13,294
December 1944			
Stocks on hand, beginning of month	796,118	29,207	10,316
Production	536,533	23,910	3,553
Received from other acidulators (inc. exchange transfers)	11,962	....	....
Book adjustments (account of inventory)	−5,927	....	....
Total supply	1,338,686	53,117	13,869
Disposition, total	545,091	20,629	763
Shipments, total	311,422	20,212	470
Used in reporting plants	233,669	417	293
Stocks on hand, end of month	793,595	32,488	13,106
January 1944			
Stocks on hand, beginning of month	790,310	41,580	16,078
Production	574,172	29,213	6,047
Received from other acidulators (inc. exchange transfers)	3,747	....	....
Book adjustments (account of inventory)	−311	....	....
Total supply	1,367,918	70,793	22,125
Disposition, total	524,173	22,904	6,656
Shipments, total	298,193	22,726	6,407
Used in reporting plants	225,980	178	249
Stocks on hand, end of month	843,745	47,889	15,469

Table 2—Superphosphate: Production, Disposition, and Stocks, Classified by Type, in the United States, 1944
(In short tons—2,000 pounds)

Product	*Total for year*	*January*	*February*	*March*	*April*	*May*	*June*	*July*	*August*	*September*	*October*	*November*	*December*
Normal Superphosphate (basis 18% A.P.A.)													
Supply, Total	xxx	1,367,918	1,466,287	1,425,745	1,279,410	1,272,644	1,285,053	1,271,600	1,312,843	1,242,998	1,344,764	1,355,857	1,338,686
Stocks on hand, beginning of month	xxx	790,310	843,745	816,574	724,581	642,306	709,687	759,131	751,485	764,180	783,274	797,312	796,118
Production during month	6,692,368	574,172	611,578	593,916	547,901	624,962	566,044	506,676	552,295	473,390	553,525	551,376	536,533
Receipts at plants	87,044	3,747	7,671	18,291	5,889	7,279	4,024	4,210	4,520	3,809	8,374	7,268	11,962
Book adjustments (account of inventory)	+5,690	−311	+3,293	−3,036	+1,039	−1,903	+5,298	+1,583	+4,543	+1,619	−409	−99	−5,927
Disposition, Total	6,781,817	524,173	649,713	701,164	637,104	562,957	525,922	520,115	548,663	459,724	547,452	559,739	545,091
Shipments, total	3,951,402	298,193	371,441	400,450	381,740	335,918	356,102	309,712	294,351	261,602	317,249	313,222	311,422
Used in reporting plants	2,830,415	225,980	278,272	300,714	255,364	227,039	169,820	210,403	254,312	198,122	230,203	246,517	233,669
Stocks on hand, end of month	xxx	843,745	816,574	724,581	642,306	709,687	759,131	751,485	764,180	783,274	797,312	796,118	793,595
Concentrated Superphosphate (basis 45% A.P.A.)													
Supply, Total	xxx	70,793	77,687	76,112	77,459	76,243	71,065	66,945	66,350	57,583	51,456	48,314	53,117
Stocks on hand, beginning of month	xxx	41,580	47,889	50,560	51,409	51,937	50,157	43,957	47,706	36,575	31,879	28,064	29,207
Production during month	281,076	29,213	29,798	25,552	25,991	23,197	20,908	23,029	18,644	21,008	19,576	20,250	23,910
Receipts at plants	....	....	....	....	....	....	....	....	....	....	....	....	....
Book adjustments (account of inventory)	+1,128	....	....	....	+59	+1,109	....	−41	....	....	+1	....	....
Disposition, Total	291,296	22,904	27,127	24,703	25,522	26,086	27,108	19,239	29,775	25,704	23,392	19,107	20,629
Shipments, total	288,548	22,726	26,853	24,497	25,198	25,632	26,903	19,109	29,611	25,639	23,272	18,896	20,212
Used in reporting plants	2,748	178	274	206	324	454	205	130	164	65	120	211	417
Stocks on hand, end of month	xxx	47,889	50,560	51,409	51,937	50,157	43,957	47,706	36,575	31,879	28,064	29,207	32,488
Wet-Base Goods (basis 18% A.P.A.)													
Supply, Total	xxx	22,125	21,802	18,182	11,116	8,010	6,336	6,642	6,634	9,064	9,519	11,192	13,869
Stocks on hand beginning of month	xxx	16,078	15,469	11,440	7,502	4,841	4,041	3,001	4,047	5,716	7,465	8,520	10,316
Production during month	46,848	6,047	6,294	6,742	4,265	3,035	2,643	3,642	2,582	3,319	2,054	2,672	3,553
Receipts at plants	....	....	....	....	....	....	....	....	....	....	....	....	....
Book adjustments (account of inventory)	−793	....	+39	....	−651	+134	−348	−1	+5	+29	....	....	....
Disposition, Total	49,027	6,656	10,362	10,680	6,275	3,969	3,335	2,595	918	1,599	999	876	763
Shipments, total	40,511	6,407	9,148	8,768	4,299	3,045	3,090	2,325	585	1,353	651	370	470
Used in reporting plants	8,516	249	1,214	1,912	1,976	924	245	270	333	246	348	506	293
Stocks on hand, end of month	xxx	15,469	11,440	7,502	4,841	4,041	3,001	4,047	5,716	7,465	8,520	10,316	13,106

received from the reporting companies after issuance of the current monthly releases. Therefore, the monthly statistics shown in Table 2 supersede those published in the previous monthly issues of this series and may be regarded as final. The remarks in the preceding paragraph concerning coverage, and the general explanation of the figures apply also to the statistics shown in Table 2.

Iron Ore Production

Iron ore production in the United States in 1944 amounted to 94,622,000 gross tons as estimated by the Bureau of Mines, United States Department of the Interior, a decrease of 7 per cent from the 1943 output of 101,247,835 tons. This decline was largely due to lowering Great Lakes shipments in order to reduce large stocks at plants consuming Lake Superior iron ore.

Shipments of iron ore in 1944 decreased 4 per cent from 1943 and amounted to 95,532,000 gross tons. The estimated value of iron ore shipments in 1944 was $262,135,000 compared with $269,016,546 in 1943. The average value per gross ton was $2.74 in 1944, and $2.70 in 1943.

Total stocks of iron ore at mines on December 31, 1944, were estimated at 4,424,000 gross tons compared with 5,169,525 tons at the end of 1943, a decrease of 14 per cent. Seventy-eight per cent of

Chemicals: United States Production, Consumption, and Stocks, February 1945

Statistics on the production, consumption and stocks of chemicals shown in the following table supplement the 1941-1943 figures released February 7, 1944, in "Facts for Industry," Series 6-1-1. Figures for earlier months, information on the number of plants manufacturing each chemical, and a discussion of the limitations of the data are given in the above-mentioned publication. The production figures represent primary production and do not include purchased or transferred material. The consumption statistics are for consumption only in the plants where each chemical is produced. The stocks figures represent the quantities of each chemical on hand at the end of the month at producing locations only.

		February (Preliminary)			*January (Revised)*		
Chemical and Basis	*Units*	*Production*	*Consumption in producing plants*	*Stocks at producing plants, end of month*	*Production*	*Consumption in producing plants*	*Stocks at producing plants, end of month*
Acetylene:							
For use in chemical synthesis	M cu. ft.	(1)	(1)	(1)	(1)	(1)	(1)
For commercial purposes	M cu. ft.	(1)			(1)		
Aluminum chloride:							
Anhydrous and crystal (100% $AlCl_3$)	M pounds	4,977	(2)	3,063	5,140	(2)	3,428
Solution (32° Be')	M pounds	1,084	....	525	1,034	....	503
Aluminum sulfate:							
Commercial (100% $Al_2(SO_4)_3$)	M pounds	(3)	(3)	(3)	(3)	(3)	(3)
Iron free (100% $Al_2(SO_4)_3$)	M pounds	(3)	(3)	(3)	(3)	(3)	(3)
Synthetic anhydrous ammonia (100% NH_3)[4]	Short tons	44,756	33,524	6,766	49,863	35,290	7,409
Ammonium chloride (100% NH_4Cl)	M pounds	4,734	....	2,122	5,075	....	2,659
Barium sulfate (Blanc fixe') (100% Ba SO_4)	M pounds	4,709	3,301	4,139	5,042	3,827	3,953
Bleaching powder (35-37% Available Cl_2)	M pounds	1,909	....	350	1,950	....	389
Calcium acetate (80% $Ca(C_2H_3O_2)_2$)	M pounds	460	....	117	785	....	312
Calcium arsenate (100% $Ca_3(AsO_4)_2$)	M pounds	1,038	(2)	16,150	1,766	(2)	15,921
Calcium carbide (Commercial)	Short tons	(1)	(5)	(1)	(1)	(5)	(1)
Calcium hypochlorite (true) (70% Available Cl_2)	M pounds	1,123	(2)	1,173	1,317	(2)	1,189
Calcium phosphate:							
Monobasic (100% $CaH_4(PO_4)_2$)	M pounds	5,312	(2)	4,495	4,716	(2)	4,398
Dibasic (100% $CaHPO_4$)	M pounds	3,583	(2)	2,484	3,519	(2)	2,780
Carbon, activated	M pounds	4,476	(2)	5,281	5,069	(2)	4,753
Carbon black (Channel):							
Rubber grade	M pounds	32,898	....	19,002	35,667	....	24,396

Synthetic organic chemicals: United States production, consumption, and stocks

The data given in the following table supplement the figures released beginning March 1, 1944, in the Facts for Industry Series 6-2-1 to 6-2-13. Information concerning the limitations of the data, the completeness of coverage, and the selection of items were given in the Series 6-2-1 report.

In the table, production (except as noted in footnote 10) includes material produced whether consumed in the producing plants or sold. Consumption represents consumption at producing plants only; it includes material produced in such plants, or material purchased or transferred from other plants. Stocks are company stocks, as of the last day of the year or month, located at plant, in transit, or in warehouse, and include purchased as well as produced material.

(In pounds, except that creosote oil is expressed in gallons)

	Total 1944			*January 1944*			*January 1945*		
Item	*Production*	*Consumption*	*Stocks*	*Production*	*Consumption*	*Stocks*	*Production*	*Consumption*	*Stocks*
Acetanilide (technical and U.S.P.)	4,670,813	1,831,086	373,689	439,148	270,369	757,278	[4]	84,432	393,903
Acetic acid (synthetic)[1]	291,953,913	208,669,173	7,626,408	25,234,708	19,555,315	9,436,835	26,314,624	20,464,074	10,889,650
Acetic acid (natural, including that from calcium acetate)[2]	40,489,764	[4]	1,486,345	3,512,324	[4]	1,529,208	3,211,541	[4]	1,520,274
Acetic anhydride[3]	493,654,125	378,547,281	12,108,161	39,966,091	29,550,413	9,645,759	Published quarterly		
Acetylsalicylic acid (Aspirin)	9,256,636	[4]	980,264	753,887	[4]	749,336	886,502	[4]	1,114,273
n-Butyl acetate	69,758,996	[4]	3,044,207	5,699,444	149,275	2,298,399	6,270,675	170,445	3,578,806
Creosote oil, tar distillers[5]	121,149,971	9,785,877	9,943,340	11,305,961	810,998	19,155,075	9,531,624	760,359	8,863,095
Creosote oil, byproduct[6]	41,425,558	652,051	767,701	2,965,392	160,186	1,380,822	3,041,278	21,602	832,225
Cresols, meta-para[7]	7,072,828	1,178,183	412,678	562,320	[4]	151,606	666,188	203,174	[4]
Cresols, ortho-meta-para[7]	9,910,680	[4]	163,869	584,661	.....	304,561	735,034	[4]	[4]
Cresylic acid, crude	25,726,115	[4]	890,484	1,965,334	[4]	1,306,714	2,336,198	[4]	1,114,677
Cresylic acid, refined[7]	40,725,366	[4]	1,694,161	2,723,855	[4]	1,982,414	2,675,625	[4]	1,471,662
Diethyl ether (all grades)	69,756,693	[4]	4,505,445	4,967,093	[4]	2,463,017	7,621,243	[4]	3,039,799
Ethyl acetate (85 percent)	108,181,447	16,213,793	6,240,742	9,914,309	1,513,656	5,105,921	9,027,451	1,824,469	6,873,049
Lactic acid (edible)	[4]	[4]	168,445	427,944	[4]	345,584	411,445	[4]	238,442
Lactic acid (technical)	4,217,062	195,018	291,339	246,138	10,009	172,358	417,059	17,232	221,530
Methyl chloride (all grades)	24,635,938	[4]	426,121	1,291,121	[4]	1,078,377	2,583,022	[4]	619,659
Naphthalene, less than 79° C. (coke-oven operators)[8]	102,638,980	.....	2,060,215	9,368,375	.....	2,447,785	7,358,866	.....	2,085,135
Naphthalene, less than 79° C. (tar distillers)[9]	[10]203,085,250	[4]	7,251,964	[10]15,072,813	[4]	9,827,554	[10]15,387,355	[4]	7,479,726
Naphthalene, refined (79° C. and over)	82,138,629	55,623,912	2,091,252	7,268,318	4,061,657	3,042,885	5,380,973	4,217,039	2,098,577
Oxalic acid (technical)	17,981,554	[4]	311,210	1,490,234	[4]	681,722	1,663,270	[4]	400,252
Phenobarbital and sodium salts	234,074	93,940	41,924	22,484	[4]	66,415	20,309	[4]	36,225
Phthalic anhydride	124,063,494	38,994,787	1,749,103	9,205,342	2,570,729	1,564,253	10,319,502	3,921,283	1,512,079
Riboflavin (for human use)	[4]	[4]	35,081	9,783	[4]	24,151	[4]	1,688	32,832
Sulfa drugs (total)	4,597,050	909,871	796,192	653,798	198,104	1,392,334	377,480	[4]	780,850

[1] Excludes statistics on recovered acetic acid, which are confidential.

[2] Natural acetic acid (produced by direct process from wood) and acetic acid distilled from calcium acetate. These statistics are collected and compiled by the U. S. Bureau of the Census.

[3] Represents all acetic anhydride, including that produced from acetic acid by the vapor-phase process.

[4] Confidential; publication would disclose operations of individual companies.

[5] Product of distillers who use purchased coal tar only.

[6] Product of byproduct coke-oven operators only. These statistics are collected and compiled by the Coal Economics Division, U. S. Bureau of Mines.

[7] Statistics represent total production, consumption, and stocks, including both data reported by coke-oven operators to the Coal Economics Division, Bureau of Mines, and data reported by distillers of purchased coal tar to the U. S. Tariff Commission. Data reported to the two agencies are combined to prevent the disclosure of the operations of individual companies.

[8] Includes only the production, consumption and stocks of coke-oven operators. Statistics combine the three grades (solidifying at less than 74° C., at 74° C. to less than 76° C., and at 76° C. to less than 79° C.) in order to prevent the disclosure of the operations of individual companies. These statistics are collected and compiled by the Coal Economics Division, Bureau of Mines.

[9] Includes only the production, consumption and stocks of distillers of purchased coal tar. Statistics combine the grades specified in footnote 8, in order to prevent the disclosure of the operations of individual companies.

[10] For the grade solidifying at less than 74° C., these statistics represent production for sale only; for the other two grades, they represent production both for consumption within the producing plant and for sale. Production for consumption of the grade solidifying at less than 74° C. is excluded in order to minimize duplication as this grade is frequently converted to grades of higher melting point.

[11] Includes acetylsulfathiazole produced both as a sulfa drug and as an intermediate, resulting in an appreciable duplication which is unavoidable.

Source: Statistics collected and compiled by the U. S. Tariff Commission, except where otherwise noted.

Chemicals: United States Production, Consumption, and Stocks, February, 1945 (cont'd.)

Chemical and Basis	Units	February (Preliminary) Production	February (Preliminary) Consumption in producing plants	February (Preliminary) Stocks at producing plants, end of month	January (Revised) Production	January (Revised) Consumption in producing plants	January (Revised) Stocks at producing plants, end of month
Other than rubber grade	M pounds	2,502	....	14,980	2,462	....	16,136
Carbon dioxide:							
liquid and gas	M pounds	(1)	(1)	(1)	(1)	(1)	(1)
Solid (dry ice)	M pounds	(1)	....	(1)	(1)	....	(1)
Chlorine	Short tons	92,066	56,321	5,978	103,953	61,794	8,127
Chrome green (C. P.)	M pounds	546	62	1,274	646	82	1,200
Chrome yellow and orange (C. P.)	M pounds	2,978	245	1,930	3,356	348	1,856
Copper acetoarsenite (Paris green)	M pounds	(1)	(2)	(1)	(1)	(2)	(1)
Hydrochloric acid (100% HCl)	Short tons	33,671	21,560	3,110	*35,155	*23,234	*3,004
Hydrogen	Millions of cubic feet	(1)	(1)	(5)	(1)	(1)	(5)
Hydrogen peroxide (100 volume)	M pounds	2,537	108	1,962	2,636	99	1,604
Lamp black	M pounds	1,086	(2)	962	1,121	(2)	1,377
Lead arsenate (acid and basic)	M pounds	(1)	(1)	(1)	(1)	(1)	(1)
Iron blue (C.P.)[6]	M pounds	742	126	765	817	145	841
Lead oxide:							
Red (C. P.)	M pounds	8,136	204	4,178	7,911	177	3,708
Yellow (C. P.)	M pounds	26,432	5,923	9,591	29,647	7,076	9,473
Methanol:							
Natural (80% CH_3OH)	M gallons	279	(5)	287	317	(5)	278
Synthetic (100% CH_3OH)	M gallons	5,827	(2)	3,743	6,455	(2)	3,166
Molybdate chrome orange (C. P.)	M pounds	100	(2)	127	137	2	135
Nitric acid (100% HNO_3)	Short tons	40,067	35,329	6,825	*40,876	*36,588	*7,027
Nitrous oxide	M gallons S.T.P.	(1)	....	(1)	(1)	....	(1)
Oxygen	M cu. ft.	(1)	(1)	(2)	(1)	(1)	(2)
Phosphoric acid (50% H_3PO_4)	Short tons	51,128	44,968	14,285	*51,264	*45,161	*13,378
Potassium bichromate and chromate (100%)	M pounds	559	....	531	596	....	519
Potassium hydroxide (caustic potash) (100% KOH)	Short tons	3,813	748	1,521	4,124	812	1,463
Soda ash (Commercial sodium carbonate):							
Ammonia soda process—							
Total wet and dry (98-100% Na_2CO_3)[7]	Short tons	331,952	....	....	365,718	....	....
Finished light (98-100% Na_2CO_3)[8]	Short tons	171,929	47,656	47,730	185,516	52,829	41,465
Finished dense (98-100% Na_2CO_3)	Short tons	107,795	1,700	46,018	124,948	2,785	35,193
Natural[9]	Short tons	13,569	....	2,502	14,468	....	3,206
Sodium bicarbonate (refined) (100% $NaHCO_3$)	Short tons	11,552	(2)	5,091	12,614	(2)	5,672
Sodium bichromate and chromate (100%)	Short tons	6,409	(2)	857	6,582	(2)	823
Sodium bisulfite (100% $NaHSO_3$)	M pounds	2,448	(2)	907	2,947	(2)	995
Sodium hydrosulfide (100% NaSH)	M pounds	1,575	(2)	583	1,710	(2)	656
Sodium hydrosulfite (100% $Na_2S_2O_4$)	M pounds	3,208	(2)	1,218	3,121	(2)	1,393
Sodium hydroxide (caustic soda):[10]							
Electrolytic process—							
Liquid (100% NaOH)	Short tons	88,216	....	....	*97,740	....	....
Solid (100% NaOH)	Short tons	18,120	....	....	19,461	....	....
Lime-soda process—		....	35,615	65,229	....	36,233	64,204
Liquid (100% NaOH)	Short tons	58,039	....	....	63,360	....	....
Solid (100% NaOH)	Short tons	19,397	....	....	19,860	....	....
Sodium phosphate:							
Monobasic (100% NaH_2PO_4)	Short tons	(1)	(2)	(1)	(1)	(2)	(1)
Dibasic (100% Na_2HPO_4)	Short tons	(1)	(2)	(1)	(1)	(2)	(1)
Tribasic (100% Na_3PO_4)	Short tons	(1)	(1)	(1)	(1)	(1)	(1)
Meta (100% $NaPO_3$)	Short tons	(1)	(2)	(1)	(1)	(2)	(1)
Tetra (100% $Na_4P_2O_7$)	Short tons	(1)	(1)	(1)	(1)	(1)	(1)
Sodium silicate:							
Soluble silicate glass, liquid and solid (anhydrous)	Short tons	33,575	*3,491	45,129	38,397	*3,964	46,811
Sodium sulfate:							
Anhydrous (refined) (100% Na_2SO_4)	Short tons	(1)	(2)	(1)	(1)	(2)	(1)
Glauber's salt (100% $Na_2SO_4 \cdot 10H_2O$)	Short tons	(1)	(2)	(1)	(1)	(2)	(1)
Salt cake (crude) (commercial)[9]	Short tons	(1)	(2)	(1)	(1)	(2)	(1)
Sulfur dioxide	M pounds	(1)	(1)	(1)	(1)	(1)	(1)
Sulfuric acid:[9]							
Total (100% H_2SO_4)	Short tons	806,078	....	....	*853,930	....	....
Chamber process (100% H_2SO_4)	Short tons	277,842	....	....	*295,940	....	....
Contact process (100% H_2SO_4)[11]	Short tons	528,236	....	865,002	557,990	....	262,681
Net, contact process (100% H_2SO_4)[11 12]	Short tons	449,183	....	....	477,800	....	....
White lead:							
Basic lead carbonate (C. P.)	Short tons	2,188	801	3,795	*5,078	1,674	*3,514
Basic lead sulfate (C. P.)	Short tons	821	....	66	1,004	....	187
Zinc yellow (zinc chromate) (C. P.)	Short tons	1,347	(2)	363	*1,429	(2)	484

[1] Data by months are collected on a quarterly report form and are presented in releases in this "Facts for Industry" series covering the months of March, June, September and December.
[2] Data cannot be published without disclosing operations of individual establishments.
[3] Not yet available.
[4] A small amount of aqua ammonia is included in the figures reported by one company.
[5] Not available; see "Facts for Industry," Series 6-1-1.
[6] New series. Data for earlier months will be shown in a subsequent issue of this publication.
[7] Total wet and dry production, including quantities diverted for manufacture of caustic soda and sodium bicarbonate, and quantities processed to finished light and finished dense soda ash. For detailed discussion of soda ash statistics, see "Facts for Industry," Series 6-1-1.
[8] Not including quantities converted to finished dense soda ash.
[9] Natural soda ash, Glauber's salt, crude salt cake and sulfuric acid data collected in cooperation with the Bureau of Mines.
[10] Production figures represent total production of liquid material, including quantities evaporated to solid caustic and reported as such. Consumption figures represent quantities of both liquid and solid caustic consumed in producing plants exclusive of quantities of liquid caustic evaporated to solid. Stocks figures include quantities on hand of liquid and solid material.
[11] Includes sulfuric acid of oleum grades.
[12] Excludes spent acid. For detailed explanations see "Facts for Industry," Series 6-1-1.
* Revised.

the stocks at the end of 1944 were at mines in the Lake Superior district compared with 92 per cent in 1943. An additional 492,000 tons of by-product ore was in producers plants at the close of 1944.

There were 18 States in which mines produced and shipped iron ore, and two others (Delaware and Tennessee) that produced and shipped by-product ore made from pyrite.

Ferrous Scrap Stocks Decline

Stocks of iron and steel scrap at plants of consumers, suppliers, and producers continued to decline in January, 1945, approximating 5,023,000 gross tons at the end of the month, representing a change of 6 per cent from the 5,335,000 tons reported on December 31, 1944, according to a statement released by the Bureau of Mines, United States Department of the Interior. This low stockpile was the result of the additional drain from inventories by the repetition, in January, of the high scrap consumption rate reported in previous months. Consumers stocks on January 31 were 3,726,000 tons compared with 3,951,000 tons on December 31, while combined stocks of suppliers and producers were 1,297,000 tons and 1,384,000 tons on the same dates. As a consequence of the maintained high level in scrap use, consumers stocks of purchased scrap declined 218,000 tons, which was the major factor in the loss in total inventories; combined with this reduction was a decrease in stocks held by suppliers amounting to 101,000 tons, which was only slightly counteracted by an increase at plants of producers totalling 14,000 tons.

Although suppliers increased their shipments of scrap to the consuming mills, the resulting gain was not large enough, thereby forcing consumers to rely on their stockpiles of purchased scrap to provide enough material for the continued high consumption. Also, despite increases in the production and salvage of scrap, suppliers were compelled to deplete their inventories.

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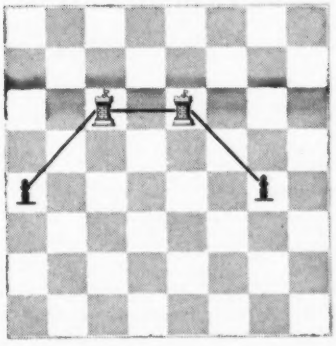

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MARKET INTERPRETATION AND REVIEW

Metal Stockpiling

Phosphate Fertilizers

Reconversion

Alcohol

Mercury from Spain

Surplus Disposal

Market Developments

Metal Stockpiling

The inventories of strategic metals being built up by the Reconstruction Finance Corporation through its subsidiary, the Metals Reserve Co., will have a stabilizing effect on the markets for these materials.

The Government has succeeded in reaching its goals in 23 of its 51 programs, and only in 16 cases has it failed to accumulate at least half of the recommended totals. Of these, 7 represent materials the quotas for which were set so recently that insufficient time has elapsed to achieve the desired goals. Only 4 are considered impossible of attainment.

For security reasons, it is not possible to quote the exact quantities involved. Figures have been released, however, giving the dollar values of the inventories and the percentages of the programs completed:

Commodities	*Inventory Oct. 31, 1944 at Market Value*
Aluminum	$61,502,540
Antimony	5,181,800
Arsenic	756,803
Asbestos	2,780,951
Bauxite	14,023,783
Beryllium	325,512
Bismuth	1,084,115
Cadmium	1,873,800
Calcite (optical)	204,009
Chromium	24,700,653
Cobalt	1,193,101
Columbium	12
Copper	111,680,135
Corundum	86,590
Cryolite	3,066,893
Diamonds (industrial)	8,619,432
Fluorspar	1,459,296
Gold	2,943,056
Graphite	445,200
Iron and Steel	2,006,235
Kyanite	185,949
Lead	26,363,977
Lithium	30,275
Magnesium	149,000
Manganese	48,037,234
Mercury	6,049,450
Mica	8,171,034
Molybdenum	1,558,523
Nickel	2,388,800
Platinum Metals	1,216,754
Quartz Crystals	10,787,801
Rutile	280,800
Silver	2,224,816
Strontium	299,940
Talc	164,550
Tantalum	1,378,407
Tin	91,989,736
Topaz	
Tungsten	46,881,668
Vanadium	3,542,565
Zinc	66,941,952
Zirconium	825,960
Totals	$563,403,105
Inventory held by various agents	10,728,404
Total of all inventories	$574,131,509

Objective Exceeded

Commodity	*Per cent of Objective Attained.*
Aluminum—Primary	180
Asbestor—Amesite (M1)	115
C. & G. 3	206
Blue	491
Baddeleyite (zirconium ore)	634
Bauxite	168
Beryl ore	132
Cobalt (contained)	166
Chrome—Chemical	122
Graphite—Madagascar fines	195
Manganese—Electrolytic	100
Mercury	144
Mica—Muscovite splittings other than book-packed	108
Mica-Muscovite block & film	231
Platinum	109
Tungsten (contained)	319
Vanadium (contained)	200
Zircon (other than baddeleyite)	101

Nearly 100% Reached

Bismuth	96
Iridium	98.5
Kyanite—Indian (1)	96
Talc—Ground	98
Zinc (contained)	99

Score 50 to 85%

Antimony (contained)	82
Cadmium	77
Calcite—No. 1 & No. 2 grades	52
Celestite (strontium ore)	59
Chrome ore—Metallurgical	81
Refractory	66
Copper	65
Cryolite	55
Diamond—Industrial	72
Fluorspar—Metallurgical	64
Graphite—Madagascar flake	55
Lead (contained)	73
Maganese ore (ferro-grade)	73
Mica—Phlogopite block	51
Phlogopite splittings	79
Book-packed muscovite splittings	68
Molybdenum (contained)	61
Quartz crystals (radio grade)	69
Spodumene (lithium ore)	58
Talc—Block	68
Tantalite	70
Tin (contained)	83

Less Than 50% Reached

Aluminum—Secondary	42
Asbestos—C. & G. I.	9
Amesite (B3, D3, 3/DM-1)	2
C. & G. 2	15
Amesite (B1)	0
Barite	13
Columbite	1
Corundum	21
Fluorspar—Acid grade	14
Graphite—Ceylon 97-98% lump	18
Magnesium—Secondary	0
Nickel (contained)	29
Osmium	14
Rhodium	4
Rutile	34
Silver (foreign)	32

Phosphate Fertilizers

The urgent necessity for a record food crop in 1945 has been stressed by War Food Administrator Marvin Jones. A prime requirement for this, of course, is sufficient fertilizer materials. The supply of these, the American Potash Institute points out, is dependent somewhat on the progress of the war. If hostilities continue, demands of munition makers for nitrogen and sulfuric acid may interfere with a full supply of nitrogenous fertilizer and superphosphate. Potash, on the other hand, is expected to be available in adequate amounts.

Pertinent in this regard is the bill before Congress to appropriate $3,000,000 for a superphosphate plant near Mobile, Ala. An interim report of the Tennessee Valley Authority makes several recommendations, among which are these:

1. Greatly increased use of mineral fertilizers, particularly phosphates, is essential to the future security of the American people; the Nation's soils need two to three times more phosphate than the Nation now produces.

2. To supply the major part of the Nation's requirements there is urgent need for private industry to increase greatly its capacity to produce phosphatic fertilizer.

3. Farmer ownership and operation of a portion of the Nation's fertilizer manufacturing capacity is needed to assure an adequate national supply.

4. Government ownership and operation of a portion of the Nation's fertilizer capacity for the conduct of a practical plant-scale research and development program is likewise essential.

5. The phosphate's deposits of Florida and the Western States should be drawn upon for a larger part of the national requirement.

Reconversion

Some idea of what industry can expect in the way of continuance or relaxation of wartime controls as victory in Europe draws near was given recently by J. A. Krug, War Production Board chairman.

Mr. Krug said that the established policy of WPB is to relax material and production controls as rapidly as is consistent with the war against Japan.

He made it clear that WPB's reconversion plans do not contemplate any long-range programming of this country's industrial structure.

The WPB reconversion will be effected by the following procedures:

1. Cutbacks will be handled in such a way that the production load will be distributed equally throughout the nation.

2. Material allotments and preference ratings for production of such civilian products, shortages of which endanger the national economy.

3. Measures to facilitate the obtaining of tools, equipment, construction, etc., needed to begin large-scale production.

4. Suspension of many "rating floors" which prohibit acceptance or delivery of materials on unrated orders.

5. Permitting delivery and acceptance of controlled materials (steel, copper, aluminum) without allotments, subject to preference orders.

6. Relaxation of a substantial number of WPB's "L" and "M" orders. WPB will

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continue to limit production of goods requiring scarce materials.

7. Revocation of most conservation orders.

8. Relaxation of Order L-41 to permit the most urgent civilian construction.

9 Take steps to insure that small business and new producers are given opportunity to participate in restricted production.

10 Introduction of a simplified priority system.

11. Authorization of construction or production in some local areas, as exemptions to nationwide limitation orders, to permit utilization of labor and resources not practicable for war production.

12. WPB will continue controls over scarce materials such as tin, crude rubber, textiles, lumber, and many chemicals.

Alcohol

Twenty million gallons of Cuban alcohol have been purchased by the United States at 65¢ per gallon, and 70 million gallons of blackstrap molasses at 13.6¢ per gallon. These are the same prices as were paid in 1944. The United States is making no effort to purchase alcohol and molasses from the 1946 sugar crop.

Meanwhile, industrial alcohol producers have been authorized to use unlimited amounts of No. 4 and 5 corn and urged to reduce the use of wheat and grits.

In this connection, it is instructive to read Mr. Farber's figures in his article in this issue. While they are incomplete insofar as they do not include selling expense, profits, or taxes, they are interesting for comparative purposes. It is the opinion of some who are close to the industry that British demand and domestic use within Cuba will prevent the price of molasses from returning to its low prewar level and that petroleum refiners will find a more attractive outlet for refinery gases than conversion to alcohol.

In the light of these opinions—whatever they are worth—the hydrolysis of wood and the development of cheaper

(*Turn to page 876*)

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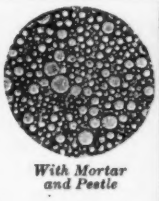

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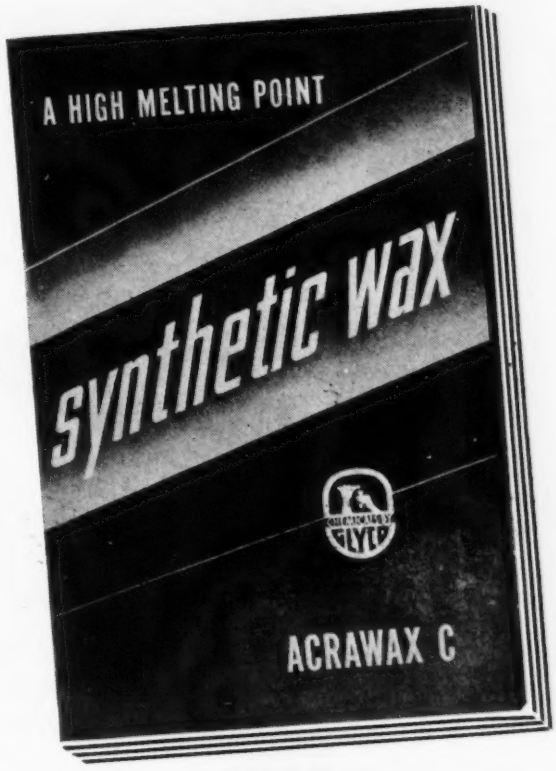

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CURRENT PRICES

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00 Apr. 1943, $0.893 Apr. 1944, $0.890 Apr. 1945, $0.871

	Current Market		1944 Low	1944 High	1943 Low	1943 High
Acetaldehyde,99%,drs.wks. lb.	.11	.14	.11	.14	.11	.14
Acetic Anhydride, drs, ...lb.	.11½	.13	.11½	.13	.11½	.13
Acetone, tks, delv. .....lb.	...	.07	...	.07	...	.07
ACIDS						
Acetic, 28%, bbls ....100 lbs.	3.38	3.63	3.38	3.63	3.38	3.63
glacial, bbls. .....100 lbs.	9.15	9.40	9.15	9.40	9.15	9.40
tks, wks. .....100 lbs.	6.93	7.25	6.93	7.25	...	6.93
Acetylsalicylic, Standard USP .....lb.	.40	.54	.40	.54	.40	.54
Benzoic, tech, bbls. .....lb.	.43	.47	.39	.47	.39	.47
USP, bbls, 4,000 lbs. up lb.	...	.54	...	.54	...	.54
Boric tech, bbls, c-l, ...tons *a*	...	109.00	...	109.00	...	109.00
Chlorosulfonic, drs, wks. ..lb.	.03	.04½	.03	.04½	.03	.04½
Citric, USP, crys, gran, bbls. .....lb. *b*	.20	.21	.20	.21	.20	.24
Cresylic 50%, 210-215° HB, drs. wks. frt. equal gal.	.81	.83	.81	.83	.81	.83
Formic, 85%-90% cbys. lb.	.10	.11½	.10	.11½	.10½	.11½
Hydrofluoric, 30% rubber, dms. .....lbs.	.08	.09	.08	.09	.08	.09
Lactic, 22%, lgt, bbls wks lb.	.039	.0415	.039	.0415	.039	.0415
44%, light, bbls wks ...lb.	.073	.0755	.073	.0755	.073	.0755
Maleic, Anhydride, drs....lb.	.25	.26	.25	.26	.25	.26
Muriatic, 18° cbys ...100 lb.	1.50	2.45	1.50	2.45	1.50	2.45
20° cbys, c-l, wks ..100 lb.	...	1.75	...	1.75	...	1.75
22° cbys, c-l, wks ..100 lb.	...	2.25	...	2.25	...	2.25
Nitric,36°,cbys, wks 100 lbs. *c*	5.00	5.25	5.00	5.25	5.00	5.25
38°, c-l, cbys, wks 100 lbs. *c*	...	5.50	...	5.50	...	5.50
40°, c-l, cbys, wks -100 lbs. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lbs. *c*	...	6.50	...	6.50	...	6.50
Oxalic, bbls, wks .....lb.	.11¼	.12½	.11¼	.12½	.11¼	.12½
Phosphoric, 100 lb. cbys, USP .....lb.	.10½	.13	.10½	.13	.10½	.13
Salicylic, tech, bbls .....lb.	.26	.42	.26	.42	.26	.44
Sulfuric, 60°, tks, wks ..ton	...	13.00	...	13.00	...	13.00
66°, tks, wks .....ton	...	16.50	...	16.50	...	16.50
Fuming 20% tks. wks .ton	...	19.50	...	19.50	...	19.50
Tartaric, USP, bbls .....lb.	.70½	.71	.70½	.71	...	.70½
Alcohol, Amyl (from Pentane) tks, delv .....lb.	...	.131	...	.131	...	.141
Butyl, normal, syn, tks lb.	...	.10¾	...	.10¾	.10¾	.14¼
Denatured, CD 14, c-l drs .....gal. *d*	...	.57	...	.57	...	.54½
Denatured, SD, No. 1, tks.*d*	...	.50	...	.50	...	.50
Ethyl, 190 proof tks...gal.	...	17.60	...	17.60	...	11.90
Isobutyl, ref'd, drs ....lb.	...	.086	...	.086	...	.086
Isopropyl ref'd, 91%, dms .....gal.	.39	.66½	.39	.66½	.39	.66½
Alum, ammonia, lump, bbls, wks .....100 lb.	...	4.25	...	4.25	...	4.25
Aluminum, 98-99% ..100 lb.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd l.c.l. wks lb.	.09	.12	.08	.12	.08	.12
Hydrate, light .....lb.	.14½	.15	.14½	.15	.14½	.15
Sulfate, com'l. bgs, wks, c-l .....100 lb.	1.15	1.25	1.15	1.25	1.15	1.25
Sulfate, iron-free, bgs, wks .....100 lb.	1.85	2.10	1.85	2.50	1.75	2.50
Ammonia anhyd, cyl .....lb.	...	.14½	...	.14½	...	.16
Ammonium Carbonate, lumps, dms .....lb.	.08¼	.09¼	.08½	.09¼	.08¼	.09¼
Chloride,whi,bbls,wks,100 lb.	4.45	5.15	4.45	5.15	4.45	5.15
Nitrate, tech. bags, wks. lb.	.0435	.0850	.0435	.0850	.0435	.0850
Oxalate pure, grn. bbls. .lb.	...	.23	.27	.33	.27	.33
Perchlorate, kgs .....lb.	No stocks		.55	.65	.55	.65
Phosphate, dibasic tech. bgs .....lb.	.07	.07¾	.07	.07¾	.07¼	.08½
Stearate, anhyd. dms....lb.		.34		.34		.34
Sulfate, dms, bulk .....ton	28.20	29.20	28.20	29.20	28.20	30.00
Amyl Acetate (from pentane) c-l, drs, delv .....lb.	...	.15½	...	.15½	...	.15½
Aniline Oil, drs .....lb.	.11½	.12½	.11½	.12½	.11½	.12½
Anthraquinone, sub, bbls. .lb.	...	.70	...	.70	...	.70
Antimony Oxide, bgs ....lb.	.15	.15½	.15	.15½	.15	.15½
Arsenic, whi, kgs—powd. lb.	.04	.04¾	.04	.04¾	.04	.04¾

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices; *y* Price given is per gal; *c* Yellow grades 25c per 100 lbs less in each case; *d* Prices given are Eastern schedule, *a* Powdered boric acid $5 a ton higher; *b* Powdered citric acid is ½c higher.

	Current Market	1944 Low	1944 High	1943 Low	1943 High
Barium Carbonate precip, wks, bgs. ton	60.00	75.00	55.00	75.00	55.00	65.00
Chloride, tech, cyst, bgs, zone 1 ton	73.00	78.00	73.00	90.00	77.00	90.00
Barytes, floated, bbls. ton	...	36.00	...	36.00	...	36.00
Bauxite, bulk mines ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde,tech,cbys,dms lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, tks, ft all'd gal.	...	.15	...	.15	...	.15
Benzyl Chloride, cbys lb.	.22	.24	.22	.28	.22	.25
Beta-Naphthol, tech, bbls, wks ton	.23	.24	.23	.24	.23	.24
Bismuth metal, ton lots lb.	...	1.25	...	1.25	...	1.25
Blanc Fixe, 66⅔% Pulp, bbls, wks ton *h*	40.00	46.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks,100 lb.	2.50	3.60	2.50	3.60	2.50	3.60
Borax, tech, c-l, bgs ton *i*	...	45.00	...	45.00	...	45.00
Bordeaux Mixture, drs lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases lb.	.21	.23	.21	.30	.25	.30
Butyl, acetate, norm. drs, lb.	.1825	.1875	.1755	.1945	.1575	.1840
Cadmium Metal lb.	.90	.95	.90	.95	.90	.95
Calcium, Acetate, bgs, 100 lb.	3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs ton	50.00	90.00	50.00	95.00	50.00	95.00
Carbonate, c-l bgs, ton	18.00	22.00	18.00	22.00	18.00	22.00
Chloride, flake, bgs c-l ton	18.50	35.00	18.50	35.00	18.50	35.00
Solid, 73-75% drs, c-l, ton	18.00	31.50	18.00	31.50	18.00	31.50
Gluconate, U.S.P., drs. lb.	.57	.59	.57	.59	.57	.58
Phosphate, tri, bbls, cl. lb.	...	.0635	.0635	.0785	.0635	.0785
Camphor, U.S.P., gran, powd, bbls lb.	.69	.71	.68½	.71	.68½	.70½
Carbon Bisulfide, 55-gal drs lb.	.05	.05¾	.05	.05¾	.05	.05¾
Dioxide, cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, Zone 1, 52½ gal. drms lb.	.73	.80	.73	.80	.73	.80
Casein, Acid Precip, bgs, 100 or more lb.	.22	.22¾	...	.24	...	.24
Chlorine, cyls, lcl, wks, contract lb.	...	.07¼	...	.07¼	...	.07¼
cyls, c-l, contract lb. *j*	...	.05¼	...	.05¼	...	.05¼
Liq, tk, wks, contract 100 lb.	...	1.75	...	1.75	...	1.75
Chloroform, tech, drs lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls, crude bbl.	8.25	8.75	8.25	8.75	8.25	8.75
Cobalt, Acetate, bbl lb.	...	.83¾	...	.83¾	...	.83¾
Oxide, black kgs lb.	...	1.84	...	1.84	...	1.84
Copper, metal 100 lb.	12.00	12.50	12.00	12.50	12.00	12.50
Carbonate, 52-54%, bbls. lb.	.19½	.20½	.19½	.20½	.19½	.20½
Sulfate, bgs, wks crypt. 100 lb.	5.00	5.50	5.00	5.50	5.00	5.50
Copperas, bulk, c-l, wks ton	...	14.00	...	14.00	...	14.00
Cresol, USP, drs lb.	.10¾	.11¾	.10¾	.11¾	.10¾	.11¾
Cyanamid, bgs ton	1.52½	1.62½	1.52½	1.62½	1.52½	1.62½
Dibutylamine, c-l, drs, wks lb.	...	.66	...	.61	...	.61
Dibutylphthalate, drs lb.	.2040	.2409	.1780	.2659	.2060	.2300
Diethylaniline, lb drs lb.	...	.40	...	.40	...	.40
Diethyleneglycol, drs, wks lb.	.14½	.15½	.14	.15½	.14	.15½
Dimethylaniline, dms,cl.,lcl lb.	.21	.22	.21	.24	.23	.24
Dimethyl phthalate, drs lb.	.1875	.1925	.1875	.1925	.1875	.2050
Dinitrobenzene, bbls lb.	...	.18	...	.18	...	.18
Dinitrochlorobenzene, dms lb.	...	.14	...	.14	...	.14
Dinitrophenol, bbls lb.	...	.22	...	.22	...	.22
Dinitrotoluene, dms lb.	...	.18	...	.18	...	.18
Diphenyl, bbls lcl. wks lb.	.16	.20	.16	.20	.15	.20
Diphenylamine bbls lb.	...	.25	...	.25	...	.25
Diphenylguanidine, drs lb.	.35	.37	...	.35	.35	.37
Ethyl Acetate, tks, frt all'd lb.	.1070	.1175	.1070	.1175	.107	.110
Chloride, drs lb.	.18	.20	.18	.20	.18	.20
Ethylene Dichloride, lcl. wks, E. Rockies, dms lb.	.0842	.0941	.0842	.0941	...	.0842
Glycol, dms, cl. lb.	...	.10	...	.10	...	.10
Fluorspar, No. 1, grd.95-98% bulk, cl-mines ton	...	37.00	...	37.00	...	37.00
Formaldehyde, bbls, cl & lcl lb.	.0520	.0570	.0520	.0570	.0550	.0575
Furfural tech, dms, c-l,wks lb.	...	.13	...	.13	...	.12½
Fusel Oil, refd, dms, dlvd lb.	.18½	.19½	.18½	.19½	.18½	.19½
Glauber's Salt, Cryst,c-l.,bgs, bbls. wks 100 lb.	1.05	1.25	1.05	1.25	1.05	1.25
Glycerin dynamite, dms, c-l, lb.	...	14½	...	.14½	...	.18¾
Crude Saponification, 80% to refiners tks lbs.	.09½	.10	.09½	.10	...	.12¾

GUMS

Gum Arabic, amber sorts bgs lb.	.12½	.13	.12	.14	.13½	.17½
Benzoin Sumatra, CS lb.	.52	1.00	.52	1.00	.52	1.00
Copal, Congo lb.	...	.55¾	...	.55¾	...	.55¾
Copal, East India, chips lb.	...	.12	...	.12	...	.12
Macassar dust lb.	...	.07⅜	...	.07⅜	.07⅜	.11¾
Copal Manila,	.13½	.15½	.13½	.15½	.13½	.15½
Copal Pontianak, bold c-l lb.	...	.23⅜	...	.23⅜	...	.23⅜
Karaya, bbls, bxs, dms, lb.	.15	.46	.15	.46	.14	.40

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.
y Price given is per gal.

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Founded 1860

Share Capital & Reserves: Swiss francs 4.000.000.—

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References:
Swiss Bank Corporation, 15 Nassau Street, New York

THAT first order set Saranac patriotically to the task of supplying Uncle Sam with parts needed in war. We are still at it — turning out gun parts and many other vital items we can't talk about now. We are trying to do the job quickly and with efficiency, backed by 50 years' experience in manufacturing precision machinery.

For this reason, you probably haven't been able to get the package-making equipment you sorely need. But some day the second order will come — "Tool Up for Peace" — and Saranac people are going to work just as hard meeting your urgent requirements.

That new container you've been thinking about as a post-war product may be most efficiently produced by one of the 100 standard Saranac machines . . . or it may be that you'll want our engineers to design a special model to suit your specific problems. In either case, your new Saranac will have a half century of skill and craftsmanship behind it.

The Saranac Engineering Service is always ready to help. It's none too early to be setting up your future production plans. Why not write today? No obligation, of course.

★ ★ ★

SARANAC MACHINE CO
BENTON HARBOR, MICHIGAN

Current Prices

Gums
Salt Cake

		Current Market	1944 Low	1944 High	1943 Low	1943 High
Kauri, N. Y.						
Superior Pale XXX	lb.	...	.65¾	...	.65¾	... .65¼
No. 3	lb.	...	.25	...	.23	... .22
Sandarac, cs	lb.	...	.99½	...	.99½	1.40 nom.
Tragacanth, No. 1, cases	lb.	4.50	5.00	4.00	5.25	4.00 5.25
No. 3	lb.	2.75	3.00	1.10	3.50	1.10 1.20
Yacca, bgs	lb.	...	.06	.06	.07¼	.06 .07¼
Hydrogen Peroxide, cbys	**lb.**	**.15½**	**.18½**	**.15½**	**.18½**	**.15½ .18½**
Iodine, Resublimed, jars	lb.	2.00	2.10	2.00	2.10	2.00 2.10
Lead Acetate, cryst, bbls.	lb.	...	.12½	...	.12½	... .12½
Arsenate basic, bg, lcl.	lb.	.11½	.12	.11½	.12	.11½ .12
Nitrate, bbls	lb.	...	.12½	...	.12½	... .12½
Red, dry, 95% Pb_3O_4 bbls.	lb.	.09	.10¾	.09	.11	.09 .11
97% Pb_3O_4, bbls delv.	lb.	.09½	.11	.09¼	.11	.09¼ .11
98% Pb_3O_4, bbls delv.	lb.	.09½	.10¾	.09½	.11¼	.09½ .11¼
White, bbls	lb.	.08¼	.08¾	.08¼	.08¾	.08¼ .08¾
Basic sulfate, bbls, lcl	lb.	.07½	.08	.07¼	.08	.07¼ .08
Lime, Chem., wks, bulk	ton	6.25	13.00	6.25	13.00	6.25 13.00
Hydrated, f.o.b. wks	ton	8.50	16.00	8.50	16.00	8.50 16.00
Litharge, coml, delv. bbls	lb.	.08	.08¼	.08	.09¾	.08 .09¾
Lithopone, ordi., bgs	lb.	.04¼	.04½	.04¼	.04¾	.04¼ .04¾
Magnesium Carb, tech, wks	lb.	.06¼	.09¾	.06¼	.09¾	.06¼ .09¼
Chloride flake, bbls, wks c-l	ton	...	32.00	...	32.00	... 32.00
Manganese, Chloride, Anhyd. bbls	lb.	.15	.18	.15	.18	.14 nom.
Dioxide, Caucasian bgs, lcl	ton	...	74.75	...	74.75	... 74.75
Methanol, pure, nat, drs gal *l*		.63	.76	.63	.76	.63 .76
Synth, drs cl gal. *m*		.31	.38	.31	.40½	.34½ .40½
Methyl Acetate, tech tks	lb.	.06	.07	.06	.07	.06 .07
C.P. 97-99%, tks, delv	lb.	.09½	.10½	.09½	.10½	.09½ .10½
Chloride, cyl	lb.	.32	.40	.32	.40	.31 .40
Ethyl Ketone, tks, frt all'd	lb.	...	.08	...	.08	... .08
Naphtha, Solvent, tks	gal.	...	.27	...	.27	... .27
Naphthalene, crude, 74°, wks tks	lb.	...	.0275	...	.0275	... .0275
Nickel Salt, bbls, NY	lb.	.13	.13½	.13	.13½	.13 .13½
Nitre Cake, blk	ton	...	16.00	...	16.00	... 16.00
Nitrobenzene, drs, wks	lb.	.08	.09	.08	.09	.08 .09
Orthonisidine, bbls	lb.	...	.70	...	.70	... .70
Orthochlorophenol, drs	lb.	.25	.27	.25	.32	... .32
Orthodichlorobenzene, drms	lb.	.07	.08	.07	.08	.07 .08
Orthonitrochlorobenzene, wks	lb.	.15	.18	.15	.18	.15 .18
Orthonitrotoluene, wks, dms	lb.	...	.09	...	.09	... .09
Paraldehyde, 98%, wks lcl.	lb.	...	.12	...	.12	... .12
Chlorophenol, drs.	lb.	.26½	.28	.25	.32	... .32
Dichlorobenene, wks	lb.	.11	.15	.11	.15	.11 .15
Formaldehyde, drs, wks	lb.	.21	.22	.23	.24	.23 .24
Nitroaniline, wks, kgs	lb.	.43	.45	.43	.45	.43 .45
Nitrochlorobenzene, wks	lb.	...	.15	...	.15	... .15
Toluenesulfonamide, bbls	lb.	...	.70	...	.70	... .70
Toluidine, bls, wks	lb.	...	.48	...	.48	... .48
Penicillin, ampules per 100,000 units		...	1.54	1.54	4.50	... ...
Pentaerythritol, tech	lb.	.29	.33	.29	.33	.29 .35½

PETROLEUM SOLVENTS AND DILUENTS

Lacquer diluents, tks, East Coast	gal.	...	.11½	...	.11½	... .11
Naphtha, V.M.P., East tks, wks	gal.	...	.11	...	.11	... .11
Rubber solvents, East, tks, wks	gal.	...	.11	...	.11	... .11
Stoddard Solvents, East, tks, wks	gal.	...	.10	...	.10	... .09½
Phenol, U.S.P., drs	lb.	.10½	.11¼	.10½	.11¼	.10½ .13¼
Phthalic Anhydride, cl and lcl, wks	lb.	.13	.14	.13	.14	.13 .15½
Potash, Caustics, 88-92%, wks, sol.	lb.	.06¼	.06¾	.06¼	.06¾	.06¼ .06¾
flake, 88-92%	lb.	.07	.07½	.07	.07½	.07 .07½
liquid, 45% basis, tks	lb.	...	.02⅞	...	.02¾	... .0275
dms, wks	lb.	.03	.03½	.03	.03½	.03 .03½
Carbonate, hydrated 83-85%	lb.	...	.05½	.05½	.05¾	.05½ .05¾
Chlorate crys, bgs, wks	lb.	.11	.13	.11	.13	.11 .13
Chloride, crys, tech, bgs, kgs	lb.	.08	nom.	.08	nom.	.08 nom.
Cyanide, drs, wks	lb.	...	.55	...	.55	... .55
Iodide, bots., or cans	lb.	1.44	1.48	1.44	1.48	1.44 1.48
Muriate, dom, 60-62-63% K_2O bulk unit-ton	ton	...	.53½	...	.53½	.53½ .56
Permanganate, USP, wks dms	lb.	.20½	.21	.20½	.21	.20½ .21
Sulfate, 90%, basis, bgs	ton	...	36.25	...	36.25	... 36.25
Propane, group 3, tks	gal.	...	.03¾	...	.03¾	... .03¾
Pyridine, ref., drms	lb.	.45	.45½	.45	.46	.45½ .46
R Salt, 250 lb bbls, wks lb.		...	.65	...	.65	... .65
Resorcinol, tech., drms, wks	lb.	.68	.75	.68	.75	.68 .75
Rochelle Salt, cryst	lb.	.43½	.47	.43½	.47	.43½ .47
Salt Cake, dom. blk wks	ton	...	15.00	...	15.00	... 15.00

l Producers of natural methanol divided into two groups and prices vary for these two divisions; *m* Country is divided in 4 zones, prices carying by zone.
* Spot price is ½c higher.

		Current Market	1944 Low	1944 High	1943 Low	1943 High
Saltpetre, grn, bbls	100 lb.	8.20	8.20	8.60	8.20	8.60
Shellac, Bone dry, bbls	lb. *r*	.42½	.42½	.46	.42½	.46
Silver Nitrate, 100 oz, bots	oz.	...	.32⅜	...	.32⅜	.32⅜
Soda Ash, 58% dense, bgs, c-l, wks	100 lb.	...	1.15	...	1.15	...	1.15
58% light, bgs cl	100 lb.	1.05	1.13	1.05	1.13	...	1.13
Caustic, 76% flake drms, cl	100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drms,cl	100 lb.	...	2.30	...	2.30	...	2.30
Liquid, 47-49%, sellers, tks	100 lb.	...	1.95	...	1.95	...	1.95
Sodium Acetate, anhyd. dms	lb.	.08½	.10	.05	.10	.05	.06
Benzoate, USP dms	lb.	.46	.52	.46	.52	.46	.52
Bicarb, tech., bgs., cl., works	100 lb.	1.55	1.90	1.55	2.05	...	...
Bichromate, bgs.wks l.c.l.	lb.	.07⅞	.08⅛	.07⅞	.08⅛	...	.07¾
Bisl fite powd, bbls, wks	100 lb.	3.00	3.60	3.00	3.60	3.00	3.60
35° bbls., wks	100 lb.	1.40	1.65	1.40	1.65	1.40	1.65
Chlorate, kgs, wks c.l.	lb.	...	.06¼	...	.06¼	...	.06¼
Cyanide, 96-98%, wks	lb.	.14½	.15	.14½	.15	.14½	.15
Fluoride, 95%, bbls, wks	lb.	.07¼	.08¼	.07¼	.08¼	.07¼	.08¼
Hyposulfite, cryst, bgs, cl, wks	100 lb.	...	2.25	...	2.25	...	2.25
Metasilicate, gran, bbl, wks c-l	lb.	...	2.50	...	2.50	...	2.50
Nitrate, imp, bgs	ton	...	33.00	...	**33.00**	...	**33.00**
Nitrite, 96-98% bbl. cl.	lb.	...	.06¾	...	.06¾	...	.06¾
Phosphate, di anhyd. bgs. wks.	100 lb.	6.00	7.25	6.00	7.25	6.00	7.25
Tri-bgs, cryst, wks	100 lb.	2.70	3.40	2.70	3.40	2.70	3.45
Prussiate, yel, bbls. wks	lb.	...	.11	.10	.11	.10	.11
Silicate, 52°,drs. wks	100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
40°, drs, wks, c-l	100 lb.	...	.80	...	.80	...	.80
Silicofluoride, bbls NY	lb.	.06½	.10	.06½	.12	.05	.12
Sulfate tech. Anhyd, bgs	100 lb.	1.70	1.95	1.70	1.90	1.70	1.90
Sulfide, cryst c-l, bbls, wks	100 lb.	...	2.40	...	2.40	...	2.40
Solid, bbls, wks	lb.	3.15	3.90	3.15	3.90	3.15	3.90
Starch, Corn, Pearl, bgs	100 lb.	...	4.08	...	4.08	...	3.47
Potato, bgs, cl	lb.	...	.0637	...	.0637	...	.0637
Rice, bgs	lb.	no stocks		no stocks		.09½	.10¼
Sweet Potato, bgs	100 lb.	.09	.09¼	.07½	.09¼	...	.07½
Sulfur, crude, mines	ton	...	16.00	...	16.00	...	16.00
Flour, USP, precp, bbls, kgs	lb.	.18	.30	.18	.30	.18	.30
Roll, bbls	100 lb.	2.40	2.90	2.40	2.90	2.40	2.90
Sulfur Dioxide, liquid, cyl	lb.	.07	.09	.07	.09	.07	.08
tks, wks	lb.	...	.04	.04	.06	.04	.06
Talc, crude, c-l, NY	ton	...	13.00	...	13.00	...	13.00
Ref'd, c-l, NY	ton	13.00	21.00	13.00	21.00	13.00	21.00
Tin, crystals, bbls, wks	lb.	no stocks		no stocks		no stocks	
Metal	lb.	...	.52	...	.52	...	.52
Toluol, drs, wks	gal.	...	.33	...	.34½	...	.33
tks, frt all'd	gal.	...	.28	...	.28	...	.28
Tributyl Phosphate, dms lcl, frt all'd	lb.	...	.49	...	.49	...	.47
Trichlorethylene, dms, wks	lb.	.08	.09	.08	.09	.08	.09
Tricresyl phosphate tks.	lb.	...	.24	...	.24	...	...
Triethylene glycol, dms	lb.	.18½	.19½	.18½	.26	...	.26
Triphenyl Phos, bbls	lb.	.31	.32	.31	.32	.31	.32
Urea, pure, cases	lb.	...	.12	...	.12	...	.12
Wax, Bayberry, bgs	lb.	no stocks		.25	nom.	.25	.26
Bees, bleached, cakes	lb.	...	.60	...	.60	...	.60
Candelilla, bgs crude	ton	.35	.36	.34½	.48	.38	.48
Carnauba, No. 1, yellow, bgs, ton	lb.	...	.83¼	...	.83¼	...	.83¼
Xylol, Indus. frt all'd, tks, wks	gal.	...	.27	...	.27	...	.27
Zinc Chloride tech fused, wks	lb.	.05	.0535	.05	.0535	.05	.0535
Oxide, Amer, bgs, wks	lb.	.07¼	.07½	.07	.07½	.07	.07½
Sulfate, crys, bgs	100 lb.	3.40	4.15	3.40	4.35	3.60	4.35

Oils and Fats

Babassu, tks, futures	lb.	...	.111	...	.111	...	.111
Castor, No. 3, bbls	lb.	.13¾	.14¼	.13¾	.14¼	.13¾	.14¼
China Wood, drs, spot NY	lb.	.39	.40	.39	.40	...	.39
Coconut, edible, drs NY	lb.	...	.0985	...	.0985	...	.0985
Cod Newfoundland, dms	gal.	.85	.88	.85	.90	...	.90
Corn, crude, tks, wks	lb.	...	.12¾	...	.12¾	...	.12¾
Linseed, Raw, dms, c-l	lb.	...	.1550	.1510	.1560	...	.1530
Menhaden, tks	gal.	...	.1225	...	.1225	...	.1225
Light, pressed, drs l.c.l.	lb.	...	.1300	...	.1200	.1305	.1307
Palm, Niger, dms	lb.	...	.0865	...	.0865	...	.0865
Peanut, crude, tks, f.o.b. wks	lb.	.12⅞	.13⅞	.12⅞	.13⅞	...	.18
Perilla, crude dms, NY	lb.	no stocks		...	.245	...	.245
Rapeseed, New Orleans, bulks	lb.	...	.1156½	...	.1156½	...	.1150
Red, dms	lb.	.13¼	.14¼	.13¼	.14¼	...	...
Soy Bean, crude, tks, wks	lb.	...	.1175	...	.1175	...	.1175
Tallow, acidless, bbls	lb.	...	.14¼	...	.14¼	...	.14¼
Turkey Red, single, drs	lb.	.9½	.11	.9½	.14½	.10	.14½

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3—De Laval Type E Vertical Worm Gear, Ratio 70 to 1, 1200 R.P.M. Input—10 H.P.
1—D.O. James—Size 1168 Vertical Worm Gear, Ratio 28.33 to 1, with base plate for 5 H.P. motor drive.
1—D.O. James—Size 1300 Vertical Worm Gear, Ratio 82 to 1, with base plate for 5 H.P. motor drive.
1—General Electric Vertical Gear Reduction Output Speed 5 R.P.M.—7½ H.P. G.E. Motor—Totally Enclosed—220 volts—3 phase—60 cycle.

CONDENSERS

1—Elliott Ehrhart Iron Body Surface Condenser—two pass 245 sq. ft. Surface—½" brass tubing and Tube sheet.
1—All copper condenser, Coil Type, 60 sq. ft. surface, removable from shell.

CRYSTALLIZERS

5—4' x 24' x 2'6" Deep Stainless Clad Steel, Jacketed—1800 gals.

DRYERS

1—No. 23 Devine Vacuum Shelf Dryer—13 shelves—59" x 78". 2⅜" between shelves, complete with unit surface condenser and vacuum pump.
3—Barlett & Snow Vertical Steel, Jacketed, 10' dia. x 4' high, Agitators, Reducers, 2 H.P. Motors.

EXTRACTORS

7—Burhardt & Viersen, sizes 32" & 40" dia., bronze, rubber-covered and Lith-coated baskets.

EVAPORATOR

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2—4' dia. x 4'6" deep Iron body, anchor agitator and newport drive, 400 gals.
1—4' dia. x 4' deep Iron body, agitator & drive, 400 gals.
1—3'6" dia. x 5' deep, steel jacketed, lead lined with agitator, 350 gals.
1—4'6" dia. x 3' deep, steel jacketed, with agitator and drive, 350 gals.
1—3'6" dia. x 5' deep cast steel, jacketed, no drive or agitator, 350 gals.

PEBBLE MILL

1—6' dia. x 5' Abbe Eng. Co. Pebble Mill, Porcelain lined, complete with pebbles, chain drive, 20 H.P. motor, 220 Volt, 3 phase, 60 cycle and compensator.

PUMPS

2—Wilfley Model AB Centrifugal—7½ H.P. motor—one has stainless impeller & casing—2" inlet, 1½" discharge.
1—Duriron No. 102 Centrifugal with 5 H.P. Westinghouse totally enclosed fan cooled motor, 2" suction—1½" discharge.
1—Shriver Diaphragm 3A—lead liquid ends, 90 gals., motor drive.
1—Shriver Diaphragm 3A—Rubber lined, 90 gals., motor chain drive.
4—Vacuum single phase stokes—size 8" x 6", pulley drive.
1—Quimby 4 stage Centrifugal, 500 gals.—75 H.P. G.E. motor.
1—American Well 2 stage Centrifugal, 350 gal. 30 H.P.G.E. motor, Magnetic Starter.
2—Gould Triplex Plunger—size 8" x 10"—400 gals. Pulley Drive.
1—Gould Triplex Plunger—size 3" x 4"—25 gals. V Belt Drive.
1—Kinney Rotating Plunger—Type SD 424—2" suction—2" discharge, Gear Drive.
1—Quimby Screw Type—size 2"—5 G.P.M.—55' head—motor drive.

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1—Buflovak 24"x20" Vacuum Drum Dryer.

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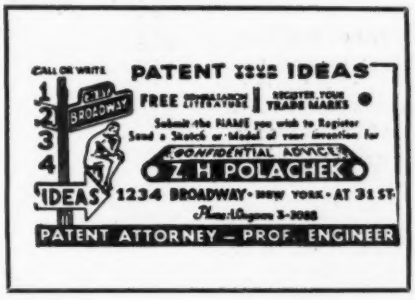
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DEFINITION: Benzol (Benzene) is the parent hydrocarbon of the aromatic compounds. It is the basic raw material for the synthesis of many organic chemicals.

HISTORY: Discovered in 1825 by Faraday in an oil obtained by compressing illuminating gas. Hofmann found it in coal-tar in 1845. The process of recovering benzol industrially was first developed by Charles Mansfield.

FORMULA

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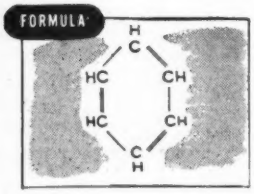
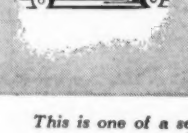


SOURCES: Benzol is obtained principally from the destructive distillation of coal. Most of the benzol produced in this operation is recovered by scrubbing coke-oven gas, while the balance is found in the portion of coal-tar that distills below 170°C.

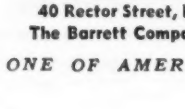
CHARACTERISTICS: The pure product is a mobile, colorless liquid. It boils at 80.1°C., and crystallizes at 5.5°C. It is practically insoluble in water but mixes readily with ether, anhydrous alcohol, petroleum distillates and many organic liquids.



USES: A solvent for stains, coatings, and rubber cements; an essential raw material for the manufacture of dyes, tetryl and other explosives, synthetic rubber, phenol, aviation fuel, and D. D. T.

GRADES:

	Sp. Gr.	Boiling Range
Benzol, Nitration Pure	.882-.886	1°C max. incl. 80.1°C
Benzol, Industrial Pure	.875-.886	2°C max. incl. 80.1°C
Benzol, 90%	.870-.886	Start: Min. 78.2°C., 90% min. at 100°C
Thiophene-free Benzol	.882-.886	1°C max. incl. 80.1°C



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Between the Lines

(*Continued from page 804*)

for magnesium has been placed too low, and, two, that a plant so acquired could produce magnesium at lower cost than the two privately owned plants already cited.

On the latter point, research by the Tariff Commission has led to the statement that "there is little to indicate that any of the Government plants can operate at costs as low as those of Dow.

"The plants which operate by the ferrosilicon process, particularly, have a history of much higher costs than the electrolytic plants. Moreover, several Government plants are very large units which could operate advantageously only with a very large output, a circumstance which will impede their disposal to private concerns."

Among the recommendations that are now under consideration, looking to the problem of price control and maintenance of an industry for future needs, are that the Government maintain one or more of its plants in standby condition, and that it maintain a magnesium stockpile.

As to the first measure, it is recognized from war experience that, generally speaking, safeguarding the magnesium supply of the country offers less of a problem perhaps than any of the other critical materials. Raw materials for its manufacture are virtually unlimited, it is pointed out, and even if no standby plants were maintained, construction of plants for production of the metal could be accomplished as rapidly as the plants to consume the magnesium output in war production could be got ready.

Present Stockpile

Incidentally, the Government has the problem of disposing of its present magnesium stocks, besides the plants. The Government holds about 100,000,000 pounds as a surplus above current operating requirements. This is stated to be equivalent to less than three months' consumption at the wartime peak of this war, but is equal to 1 to 2 years' peacetime consumption if the above estimates are correct. Due to the tendency to oxidation, there is some question as to the practicability of maintaining this particular reserve as a stockpile for the future.

As to the tariff angle, there is a question if even removal of the duty entirely would have much effect on the domestic price. There is also a plausible question as to where, abroad, magnesium production may be countenanced after the war.

Before World War II the industry was found in only a few countries. Germany was the only one in which the industry was long-established, and was in fact the principal producer until 1942. There was production in Italy and Japan but the prewar output of these countries' plants was very small. An obvious doubt suggests itself as to how much magnesium Germany, Japan, and maybe even Italy, will be making when the war ends, assuming their plants have not been physically destroyed meanwhile.

A considerable expansion of magnesium production has been noted in Great Britain, which had a small industry before the war, as had also the Soviet Union, France, and Switzerland. New plants have been built in Australia, Canada and Norway. Some of the British plants have been closed, presumably for the same reasons as those which closed the American plants.

A great many factors influence the potential success of such an industry, however, besides the availability of ample raw material. It happens that the most favorable conditions for magnesium production are found in the United States and Germany; among these are technical development, abundant electric power at relatively cheap rates, and contiguous fabricating industries, since the trade is not principally in the pure metal but in alloys, some of which must be prepared to special order.

Thus, the expected strong position of the American industry would appear to discourage the prospect of any considerable magnesium imports after the war, unless in the form of a particular alloy, for an indicated use.

The more nearly standard alloys, it has been reported, can probably be produced at least as cheaply in the United States as in Germany. As to other imports, the present United States tariff is probably double the cost of producing magnesium in the most efficient American plants. The Tariff Commission study expresses the view that "it is doubtful whether imports would become appreciable even by reducing the duty, or would become large even by placing magnesium on the duty-free list."

As to exports, the world market will depend on fabrication facilities and a greater use of magnesium alloys abroad than was formerly the case. The United States industry was on an export basis for some years even before the war, although in small amounts. During this war obviously, the bulk of American magnesium shipments abroad has been on Lend-Lease account.

U. S. Plant Capacities

According to Tariff Commission data, the following table shows the rated annual production capacity of United States plants:

The March 30 report of the Surplus War Property Board listed as of March 15, among a total of 80 surplus and excess plants of various types, the following magnesium production units: Basic Magnesium, Inc., Las Vegas, Nev.; Dow Magnesium Company, Velasco, Tex.; Mathieson Alkali Works, Inc., Lake Charles, La.; Dow Magnesium Company, Marysville, Mich.; Dow Magnesium, Ludington, Mich.; Electro Metallurgical Co., Spokane, Wash.

Markets in Review

(*Continued from page 864*)

domestic carbohydrate sources take on added significance.

Mercury from Spain

The arrival of a considerable quantity of mercury from Spain has aroused speculation as to the U. S. Attorney General's attitude towards the European cartel, Mercurio Europeo, which in prewar days handled all Spanish and Italian exports of the metal. Congressional delegations from the interested Western states are looking into the situation.

The arrival of the Spanish metal has depressed the price, and domestic producers are concerned over future possibilities. It is reported that Spain has a large stockpile.

Surplus Disposal

The increased tempo of war production has channeled most of the declared surplus back into those activities. January sales of drugs and medicines brought 52 per cent of the cost or appraised value. Sales were only $59,000 as compared with an inventory of $3,715,000.

If the entire inventory is disposed of at the same rate of return, it would appear that the pharmaceutical manufacturers are in for a prolongation of the present low prices.

Market Developments

The last two months mark the period of the most critical shortages to date. In particularly short supply were caustic soda and akalies in general, carbon black, chlorine, sulfuric acid, and copper sulfate. The lead supply was so low that WPB announced its intentions to dip into the stockpile to bolster essential civilian requirements. Other heavy chemicals in short supply were oxalic acid, calcium chloride, and sodium phosphates. Hydrofluoric and chromic acids, on the other hand, appeared to be adequate.

Among the fine chemicals, butyl alcohol and acetate rose in price. Mercury declined in view of imports from Spain, and menthol again dropped in price. Penicillin prices declined when supplies became available to civilians, but it is doubtful that the price will soon drop further. Among the scarce materials are tartaric acid, antipyrene, sodium citrate and benzoate, hydrogen peroxide, and hydroquinone.

Toluene and benzene, as well as all coal-tar chemicals, were exceedingly difficult to obtain. The prolonged shortages of these basic compounds has reduced the number of intermediates available for dyestuffs.

PART 2: PATENTS AND TRADEMARKS

Abstracts of U. S. Chemical Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of patents are available from the Patent Office at 10 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

From Official Gazette—Vol. 571, Nos. 3, 4; Vol. 572, Nos. 1, 2 (Feb. 20-Mar. 13)—p. 574

*Resins, Plastics

Preparing polymers which comprises irradiating, with light of wavelength of 1800 to 7000 Angstroms, an ethylenically unsaturated, organic compound photo-polymerizable in presence of another such compound and an alpha carbonyl alcohol. No. 2,367,661. Courtland Agre to E. I. du Pont de Nemours & Co.

Uniting surfaces of transparent polymeric methyl methacrylate which comprises interposing between said surfaces fluid, polymerizable methyl methacrylate containing benzoin and irradiating same. No. 2,367,670. Robert Christ to E. I. du Pont de Nemours & Co.

Joining thermoplastic material comprising holding surfaces to be welded adjacent each other, directing a stream of hot gas simultaneously against surfaces to be joined. No. 2,367,725. Gunnar Lindh and William Phillips, Jr. to The Udylite Corp.

Apparatus for selectively softening portion of thermoplastic arch support to be formed into fitting relationship with an individual foot. No. 2,367,804. William Scholl.

Polymerizing styrene which comprises heating styrene in presence of a hydroperoxide. No. 2,367,805. Robert Semple to Monsanto Chemical Co.

Polymerizing monomeric compounds containing a styrene nucleus having a single olefinic hydrocarbon side chain. No. 2,367,810. Victor Turkington and Leo Whiting to Bakelite Corp.

Liquid coating composition to be applied to a metal surface, said coating having high chemical resistance, good adhesion to metal surface and toughness, said composition comprising co-polymerized vinylidene chloride and vinyl chloride, solvent for co-polymer, and finely divided solid, siliceous material. No. 2,367,880. Gunnar Lindh to Udylite Corp.

Translucent picture projection screen comprising a sheet of transparent material, and a coating thereon of plastic material having embedded therein microscopic crystals adapted to polarize light. No. 2,368,099. Bernard Bodde.

Preparing resinous bodies which comprises bringing natural pine oleoresin free of a miscible liquid diluent into contact with acidic agent selected from sulphuric acid, phosphoric acid, etc. No. 2,368,165. James Shand to Ellis Laboratories, Inc.

Resinous reaction product produced by heating furfuryl alcohol and ammonium thiocyanate. No. 2,368,426. Frank Root and Carl Virgin to Ellis-Foster Co.

Polyaminotriazine - formaldehyde resin modified with a preformed mono salt of a polyaminotriazine. No. 2,368,451. Gaetano D'Alelio to General Electric Co.

Polymerizing a di-isobutenyl substituted aryl compound comprising cooling and applying catalyst comprising a solution of aluminum chloride in an alkyl halide solvent. No. 2,368,538. Anthony Gleason and William Sparks to Standard Oil Development Co.

Dry molding composition comprising cellulose acetate having acetic acid content of 52% to 58.5%, a petroleum-hydrocarbon insoluble pine wood resin, and plasticizer. No. 2,368,788. John Tinsley to Hercules Powder Co.

Preparing water soluble saponification products of polyvinyl esters which are free from impurities that break emulsions or dispersions, which comprises treating an aqueous solution of said product with activated charcoal. No. 2,368,949. Joseph Smith to E. I. du Pont de Nemours & Co.

Treating shaped mass comprising polymerized methyl methacrylate and containing voids, which comprises subjecting to 140° C. and pressure of 3000 pounds per square inch while mass is immersed in sodium acetate. No. 2,369,057. Richard Leary and Barnard Marks to E. I. du Pont de Nemours & Co.

Refining polymerized rosin esters by heating. No. 2,369,109. Alfred Rummelsburg to Hercules Powder Co.

Producing rosin ester of high oxygen resistance. No. 2,369,125. Gilbert Anderson to Hercules Powder Co.

Making valuable unsaturated resin-forming hydrocarbon material which involves vapor phase pyrolysis of petroleum oil. No. 2,369,281. Newcomb Chaney to The United Gas Improvement Co.

Resinous condensation products of diaminotetrazine and an aldehyde. No. 2,369,371. Joseph Seiberlich.

Resin composition. No. 2,369,379. Neil Tillotson.

Tough and coherent vulcanized body composed of combined vulcanization products of fatty acid triglycerides and oil soluble thermoplastic resin. No. 2,369,434. John Church to Falk & Co.

Raising softening point increasing notch-bend resistance, and improving flexibility of a polymer of ethylene, comprising blending with polymer of ethylene a polymer of butadiene and isoprene polymers, polyisobutylene halogenated ethylene polymers, polymerized chloro-2-butadiene-1,3, etc. No. 2,369,471. George Latham to E. I. du Pont de Nemours & Co.

Preparing solid polymer of formaldehyde. No. 2,369,504. Joseph Walker to E. I. du Pont de Nemours & Co.

Polymerizing monomeric compound from lower alkyl esters of acrylic acid and methacrylic acid to form a solid object. No. 2,369,520. Carl Barnes to E. I. du Pont de Nemours & Co.

Production of cast sheets which comprises filling cell composed of two plates separated by compressible gasket with a heat-polymerizable liquid capable of forming rigid polymer. No. 2,369,593. Barnard Marks and Clayton Ranck to E. I. du Pont de Nemours & Co.

*Rubber

Light gray X-ray protective rubber composition comprising predominantly pigmentary lead titanate. No. 2,367,738. Durant Robertson and Joseph Breckley to National Lead Co.

Article formed entirely of hard rubber having tensile strength of from 1000 to 9000 pounds per square inch. No. 2,367,786. Edwin Laning to Joseph Stokes Rubber Co. Inc.

Accelerator for vulcanization of rubber. No. 2,367,827. George Smith, Jr. to The Firestone Tire & Rubber Co.

Sponge rubber matrix and dispersion of aluminum metal powder distributed throughout rubber matrix. No. 2,368,190. Raymond Wood to Van Cleef Bros.

Lubricated rubber compositions consisting of substance selected from natural rubber, rubbery polymers containing polymerized butadiene, and polychloroprene, and a modified hydrocarbon wax obtained by heating wax with lithium stearate. No. 2,368,522. Mead Cornell and Gotthold Meinzer; said Meinzer to said Cornell.

Pitch base rubber compounding material dispersible in rubber comprising a blend of pitch of class consisting of coal tar pitch and water gas tar pitch, a high molecular weight aliphatic softening agent and aromatic oil. No. 2,368,807. Arthur Cowdery to Allied Chemical & Dye Corp.

*Textiles

Producing yarn, which comprises forming band of unspun textile fibers, applying solid color in fluid form to fibers by intaglio printing, fixing color, applying urea formaldehyde and fixing urea formaldehyde. No. 2,367,730. Charles Henry Masland, 2nd.

Forming sheet of material which consists in interlacing fibers to form a felted original sheet which has opposed exposed faces, connecting said fibers by adhesive to make said exposed faces smooth and compact. No. 2,368,024. Henry Himmell.

Improvement of extensibility of artificial textile materials, which comprises subjecting filamentary materials which have basis of organic derivative of cellulose, and which have been stretched in hot water or steam, to action of aqueous solution of a swelling agent. No. 2,368,154. Robert Moncrieff and Harold Bates to Celanese Corp. of America.

Treating natural cellulosic textile materials, comprising treating in hot, caustic alkali solution, washing, and then treating said materials in four dilute baths of a water-soluble acid. No. 2,368,158. Eric Ridgway and Frederick Tucker and Charles Kintner to Ridbo Laboratories, Inc.

Improving vegetable textile fibers, comprising treating with a mercerizing lye of caustic alkali containing an isopropylated phenol, and a condensation product of an aminoarylsulfonic acid, an aldehyde and a phenol. No. 2,368,277. Burkhard von Becker to Sherka Chemical Co. Inc.

Composite open mesh screen comprising warp and weft mono-fils; each of mono-fils comprising a metallic wire coated with a thermally workable synthetic resin, with said mono-fils being resilient at crimps. No. 2,368,689. Harry Thomas.

Improving water-insoluble, artificial fibers prepared from solutions of casein, comprising treating fibers with solution of salt of trivalent chromium. No. 2,368,690. Walter Tschudin to Sandoz A. G.

Textile material of organic derivative of cellulose, colored with compound selected from esters and amides of a nitrodiarylamine mono carboxylic acid. No. 2,368,723. Henry Olpin and Christopher Argyle to Celanese Corp. of America.

Textile fabric finishing composition comprising as binding agent starch modified with a polymerized terpene hydrocarbon resin. No. 2,368,782. Alfred Rummelsburg to Hercules Powder Co.

In printing nylon dyed with dischargeable ground color, with vat dye which is applied with usual printing paste containing an alkali metal sulfoxylate formaldehyde reducing agent, the step which comprises employing as only added alkali in printing paste an alkali metal carbonate. No. 2,368,940. Charles Miller to E. I. du Pont de Nemours & Co.

Preparing novel fabric containing mutifilament yarn which comprises sizing multifilament yarn with aqueous dispersion of a co-polymer of an acrylic acid ester and acrylonitrile. No. 2,368,948. James Stallings to Rohm & Haas Co.

Apparatus for producing low elongation, high tenacity artificial yarn. No. 2,369,190. Gilbert Thurmond to American Enka Corp.

Preparing freshly spun viscose rayon for reinforcing rubber articles. No. 2,369,191. Gilbert Thurmond to American Enka Corp.

Sheening pile of wool rugs which comprises subjecting pile to treatment in aqueous solution containing hydroxyl ions and a peroxygen compound, and thereafter subjecting pile to treatment in aqueous solution of a hypochlorite. No. 2,369,398. James MacMahon to The Mathieson Alkali Works, Inc.

Sheening pile of wool rugs which comprises subjecting pile to treatment in aqueous solution containing hydroxyl ions and a peroxygen compound. No. 2,369,399. James MacMahon and Lorenzo Taylor to The Mathieson Alkali Works, Inc.

*Water Sewage and Sanitation

Water-purifying and -softening device. No. 2,368,035. Ralph Moore.

Treating water supply containing small amounts of foreign matter causing odor or taste, to make it satisfactory for human consumption. No. 2,368,055. James Walker to The American Well Works.

Reducing alkalinity of raw water containing alkaline and neutral metal compounds dissolved therein. No. 2,368,574. Milton Shoemaker to Research Products Corp.

Agricultural Chemicals

Stabilized soil having dispersed therein sodium acid abietate. No. 2,369,-

* *Continued from Vol. 570, Nos. 1, 2; Vol. 571, Nos. 3, 4.*

From Official Gazette—Vol. 571, Nos. 3, 4; Vol. 572, Nos. 1, 2 (Feb. 20-Mar. 13)—p. 575

682. Abraham Miller, deceased, by Hazel Miller, administratrix, to Hercules Powder Co.

Stabilizing soil which comprises mixing with soil Portland cement and powdered pine wood resin. No. 2,370,983. Abraham Miller, deceased, by Hazel Miller, administratrix, to Hercules Powder Co.

Cellulose

Concentration of viscose which comprises mixing with viscose, allowing mixture to stratify into a layer of pyridine and water and a layer of viscose. No. 2,369,718. Francis Cramer to E. I. du Pont de Nemours & Co.

Manufacturing laminated wood article comprising applying casein glue on said laminations and uniting them, impregnating portion of structure, with a urea formaldehyde compound, and impregnating portion with solution of waxy substance such as paraffine in volatile liquid such as naphtha. No. 2,370,033. Horace Hall.

Films, sheets and other articles opaque to ultraviolet light radiations. said articles comprising organic acid ester of cellulose base material having incorporated colorless acid salt of a quinine base. No. 2,370,244. Donald Jacobs to Celanese Corp. of America.

Cellulose mixed organic acid ester sheeting containing 0.1 to 0.2% of an insoluble metal soap therein. No. 2,370,332. Howard Tanner to Eastman Kodak Co.

Insolubilization of water-soluble cellulose ethers and water-soluble, heat-hardenable, melamine-aldehyde resin, modified by condensing with polyhydric alcohol. No. 2,370,517. Shailer Bass and Firth Dennett to The Dow Chemical Co.

Regenerating cellulosic material in shaped form from solution, in inert solvent, containing cellulose derivative having cellulose nucleus, having dispersed therein high molecular weight condensation product of aromatic amine with maleic acid-olefin hydrocarbon interpolymer. No. 2,371,052. James Kirby to E. I. du Pont de Nemours & Co.

Producing solution containing cellulosic material for extrusion into coagulating bath to form shaped articles of regenerated cellulose which consists in dissolving said cellulosic material in aqueous solution containing compound selected from tri-ethyl sulfonium hydroxide, di-n-butyl methyl sulfonium hydroxide, and di-n-butyl ethyl sulfonium hydroxide. No. 2,371,359. Richard Shutt to Battelle Memorial Institute.

Ceramics

In providing surface film on glass body which consists of a single, homogeneous vitreous phase formed of network of strongly bonded silicon atoms to which weakly bonded elements other than silicon are joined by oxygen linkages, the steps of leading out from glass consisting of single homogenous vitreous phase primarily the weakly bonded elements by a leaching agent. No. 2,369,741. Frank Jones and Theodore Zak to Bausch & Lomb Optical Co.

Homogenous vitreous material as glassy water-soluble fusion product consisting of alkali metal oxide, oxide of divalent metal, selected from magnesium, calcium, strontium and barium, and P205. No. 2,370,472. Charles King to Blockson Chemical Co.

Producing opaque zirconium opacified frit comprising introducing zirconium opacified molten frit-forming material into quenching bath maintained at 180° F. to 205° F. No. 2,370,695. Paul Stufft to Pemco Corp.

Making resistance element which comprises mixing finely divided silicon carbide with finely divided metallic conductor and glassy bonding element. No. 2,371,211. Robert Barrington to General Motors Corp.

Apparatus for forming glass batches for glass furnaces. No. 2,371,213. George Batchell.

Production of reinforced ceramic building slab which comprises depositing intimate mixture of ceramic particles and thermostable, fusible inorganic bonding material in layer, etc. No. 2,371,353. Joseph Parsons to United States Gypsum Co.

Chemical Specialties

Abrasive article comprising abrasive grains and hardened binder comprising additive reaction product of neutral unsaturated monomeric material and unsaturated esterification product of an aliphatic alcohol and a polybasic acid. No. 2,369,689. Norman Robie and Osborne Mahlman to The Carborundum Co.

Grease comprising an oil, a metal soap, and a stabilizer consisting of mixture of diparamethoxydiphenylamine, diphenylparaphenylene diamine and phenyl beta naphthylamine. No. 2,369,705. Fred Woodward and Jerome Arkis.

Concentrated insecticide in dilutable paste form comprising ground root of a fish poisoning plant containing rotenone and other active principles, solvents for extracting active principles, petroleum distillate to serve after application as contact agent, dioctyl ester of sodium sulfosuccinate to prevent precipitation of active principles, and resino-cellulosic wood flour. No. 2,369,855. Henry Reynolds.

Lubricant comprising mineral lubricating oil and combination of an oil-soluble compound and oil-soluble additive component possessing anti-oxidant and anti-corrosive properties. No. 2,369,908. Rush McCleary to The Texas Co.

Emulsifying wax, having admixed insecticidal substance selected from rotenone and quassin and a soap forming aliphatic carboxylic acid, in water containing methyl cellulose and homogenizing, mixing emulsion with aqueous solution of an aluminum salt, thereby substituting aluminum in acid component at surface of said particles and imparting positive electrical charge to said particles. No. 2,369,992. Cyril Treacy to Merck & Co. Inc.

Manufacturing laminated wood article comprising applying casein glue on said laminations and uniting them, impregnating portion of structure, with a urea formaldehyde compound, and impregnating portion with solution of waxy substance such as paraffine in volatile liquid such as naphtha. No. 2,370,033. Horace Hall.

Frothing agent comprising neutral dry rosin size and dry alkali proteinate, being characterized by ability to foam in presence of gypsum. No. 2,370,058. Milton Maguire to Hercules Powder Co.

Fuel briquette comprising coal fines and binder therefor; said binder comprising fuel pitch including creosote oil and supplementary binder. No. 2,370,060. Edward Sherwood Mead.

Lubricant comprising hydrocarbon oil containing metal salt of acid ester of acid of phosphorus, and phosphatide to prevent hazi in presence of moisture. No. 2,370,080. William Schreiber to The Atlantic Refining Co.

Improving quality of lubricating oil which consists of subjecting lubricating oil stock of low viscosity index to oxidation by treating with free-oxygen containing gas and hydrogenating mixture of oil and oxidation products to produce neutral hydrocarbon oil characterized by high viscosity index. No. 2,370,228. Johannes Bruun and Mildred Hicks-Bruun to Sun Oil Co.

Abrasive grit wetted with solvent for aminotriazine-aldehyde resin and bonded with resin containing aminotriazine-aldehyde condensation product. No. 2,370,278. Gustav Widmer and Willi Fisch to Ciba Products Corp.

Compounded lubricant comprising hydrocarbon lubricating oil and organic ester comprising an aliphatic type alcohol having from ten to thirty carbon atoms in chain, purpose of ester being to decrease coefficient of friction between metal frictional surfaces at low rubbing speeds. No. 2,370,299. Bruce Farrington to Standard Oil Co. of California.

Compounded lubricant comprising hydrocarbon lubricating oil and tartaric acid ester of an aliphatic alcohol having from ten to thirty carbon atoms in chain. No. 2,370,300. Bruce Farrington to Standard Oil Co. of California.

Making wood preserving composition which comprises dissolving rosin in liquid turpentine, treating chlorine separately by passing through solution of sodium peroxide, and then passing treated chlorine into said turpentine solution. No. 2,370,378. Edward Swanson.

Rendering material water-repellent and products therefrom which comprises impregnating material with isocyanate. No. 2,370,405. Walther Kaase and Ernst Waltmann to Heberlein Patent Corp.

Separating wax from oil wherein wax is precipitated in cooled solution of oil and normally liquid dewaxing solvent heavier than wax. No. 2,370,453. Eddie Dons and Oswald Mauro to Mid-Continent Petroleum Corp.

Manufacture of abrasives. No. 2,370,636. Richard Carlton to Minnesota Mining & Manufacturing Co.

For hydraulic fluid-pressure systems, a hydraulic liquid composition having inertness to metallic and rubber parts, and comprising diethyl cyanamide, as active pressure-transmitting medium and castor oil. No. 2,370,663. William Hill to Koppers Co., Inc.

Paraffin wax-containing hydrocarbon oil having incorporated to reduce pour point of oil, a linear polymeric material having molecular weight of 1000 whose chain units are dimethylene groups and N-aliphatic-2, 5-pyrrolidinedione nuclei. No. 2,370,943. Melvin Dietrich to E. I. du Pont de Nemours & Co.

Forming shaped body of linoleum by extrusion of linoleum mix including semi-solid drying oil and resin binder together with filler particles. No. 2,371,074. Virgil Spencer to Armstrong Cork Co.

Corrosion-preventive composition comprising stable, neutral and chlorine free vehicle containing finely dispersed corrosion inhibiting amount of free dicarboxylic acid having 16 carbon atoms and possessing either-type radical. No. 2,371,142. Emmett Barnum and Ernest Zublin to Shell Development Co.

Preparing from tall oil a stable product containing resin acid and fatty acid components in proportion occurring in original material. No, 2,371,230. Russell Dressler, Robert Vivian and Torsten Hasselstrom.

Lithic immersion heating element constituted of Portland cement having disseminated therein grains of copper and iron sulphide ores and grains of gold and silver. No. 2,371,275. Byrhl Wheeler, fourteen per cent to Joseph Vigneault and twenty-six per cent to Martinien Lacombe.

Treating tall oil in liquid state with stannic chloride to improve fatty acids in tall oil. No. 2,371,307. Joseph Mitchell to Colgate-Palmolive-Peet Co.

Preparing modified tobacco product which comprises adding solution containing a hexide to said tobacco product. No. 2,371,389. Rudolph Goepp, Jr. to Atlas Powder Co.

Treating coal with concentrated liquid sulfating reagent to prepare a water-insoluble ion exchange product. No. 2,371,427. John Dean and Randall Heiligman and Ray Riley to The Permutit Co.

Composition liberating heat when added to water, comprising aluminum, alkaline agent capable of reacting with aluminum to produce heat, and sodium chlorite. No. 2,371,436. Wilmer Gangloff and Stuart Fiedler to The Drackett Co.

Hydrogen peroxide bleach consisting of hydrogen peroxide and a wetting agent selected from lauryl sulfates, alkylated benzene sulfonates, alkylated naphthalene sulfonates, etc. No. 2,371,545. Walter Riggs and Rudolf Lehmann to The Pennsylvania Salt Mfg. Co.

Coatings

Coating both surfaces of flexible sheeted materials including paper and like with mobile coating composition. No. 22,605. Lindsay Goff and Frederick Frost to S. D. Warren Co.

Composition for forming paper coating solution consisting of milk albumin, potato starch, kaolin, borax, sodium stannate, nitrobenzene, glucose and scrap leather solution which is composed of water, urea, ethylene glycol and phenol. No. 2,369,766. George Witty.

Projection screen comprising as base a transparent plastic sheet having on one side a coating containing aluminum hydroxide. No. 2,370,263. Ernest Schweizer to Celanese Corp. of America.

Paper-coating composition comprising the following: zein, sulfonated tall oil, potassium rosin size made from hydrogenated rosin, sodium hydroxide, water, china clay, heat gelatinized tapioca starch. No. 2,370,268. Charles Stewart to Corn Products Refining Co.

Pigmented protective coating composition comprising non-volatile film forming vehicle and a pigment which is product of coupling the diazo of 6-chloro-2-amino-toluene with the anilide of 2-hydroxy-3-naphthoic acid. No. 2,370,341. Harold Woodward to E. I. du Pont de Nemours & Co.

Reconditioning recovered solids of excess sprayed coating material and separating therefrom residual water introduced during its collections. No. 22,615. Seymour Saunders and Harry Morrison to Chrysler Corp.

Finishing composition which dries to a flat surface, comprising organic film-forming composition which normally dries to glossy film, having dispersed therein insoluble carbamide aldehyde condensation product, particles of condensation product being coated with flocculating agent comprising organic liquid containing alcoholic hydroxyl group. No. 2,370,648. Earl Fischer to Interchemical Corp.

Preparing fast drying film-forming composition of acid number not above 16.7, comprising reacting polyhydric alcohol partially acylated with fatty oil acid, and an alpha-beta unsaturated dicarboxylic acid. No. 2,370,962. Leo Hubbuch and Paul Robinson to E. I. du Pont de Nemours & Co.

Hard surface covering including sheet of partible fibrous material impregnated with moisture resistant substance, barrier coating applied to fibrous material, and partible coating weaker than fibrous material in resistance to rupture applied over barrier coating. No. 2,371,049. James Hazeltine, Jr. to Armstrong Cork Co.

Nonfogging coating composition comprising calcium base titanium dioxide pigment, titanium dioxide pigment, zinc oxide, alkyd resin modified with a drying vegetable oil, drier solution, aromatic hydrocarbon solvent, thiourea. No. 2,371,094. Richard Wood and Harry Young to E. I. du Pont de Nemours & Co.

High ohmic resistance comprising support body provided with conducting film, comprising single varnish or lacquer coating applied over said conducting film, whereby coating can be distorted without setting up excessive strains in film which affect stability of resistance, and as protective cover for coating, sleeve of polyvinyl chloride shrunk onto it. No. 2,371,379. Alfred Clarke to Electric & Musical Industries, Ltd.

Waxy coating and **impregnating composition** comprising waxy substance and ester of a pentaerythritol selected from pentaerythritol, dipentaerythritol, tripentaerythritol, and tetrapentaerythritol with rosin, as modifier for waxy substance. No. 2,371,473. Arthur Sanford to Hercules Powder Co.

Detergents

Converting perfumed hard cake of milled soap containing acid into hard cake of buoyant milled soap without changing formula of soap which includes reducing soap to fluid mass by boiling, adding thereto sodium bicarbonate. No. 2,371,175. Charles Kelley.

Dyes, Stains

Preparing a sulphur type dyestuff, which comprises reacting a polycyclic aromatic hydrocarbon with complex compound obtainable by heating aluminum chloride with sulphur monochloride. No. 2,369,667. Arthur Fox to E. I. du Pont de Nemours & Co.

Preparing a sulphur type dyestuff, which comprises reacting a carbocyclic compound having basic nitrogen atom with complex compound. No. 2,369,668. Arthur Fox to E. I. du Pont de Nemours & Co.

Preparing trianthrimidecarbazole vat dyes of class consisting of 1,4-trianthrimide-carbazole and 1,5-trianthrimidecarbazole wherein corresponding trianthrimides are subjected to fusion with aluminum chloride and sodium chloride, which comprise carrying out fusion in presence of anthrimide of oxidizing agent of class consisting of nitrobenzene and its sodium sulfonate. No. 2,369,951. William Dettwyler and Frederic Stilmar to E. I. du Pont de Nemours & Co.

4,7'-diamino-1 (2'-fluorenonylamino)-anthraquinone sulfonic acid and its alkali metal salts for dyeing wool. No. 2,369,969. Ralph Lulek and Oliver Johnson to E. I. du Pont de Nemours & Co.

Direct blue azo dyes. No. 2,370,500. Chiles Sparks to E. I. Du Pont de Nemours & Co.

Monoazo dyestuffs. No. 2,370,537. Basil Heywood, Arthur Knight and Morvan Lapworth to Imperial Chemical Industries, Ltd.

Color composition comprising vat dye and quinone sulphonamide derivative. No. 2,371,101. Roy Kienle and Chester Amick to American Cyanamid Co.

Color composition comprising vat dye and dicarboxylic acid diamide. No. 2,371,102. Roy Kienle and Chester Amick to American Cyanamid Co.

Color composition comprising vat dye and dicarboxylic acid diamide. No. 2,371,103. Roy Kienle and Chester Amick to American Cyanamid Co.

N,N'-di (amino) diamides of dicarboxylic acids as printing assistants. No. 2,371,104. Roy Kienle, Chester Amick and Alfred Peiker to American Cyanamid Co.

Vat dyeing process using electric current. No. 2,371,145. Carl Brubaker to The Standard Bleachery & Printing Co.

Dyeing nylon fibres with direct cotton dyestuff from acid dyebath which comprises dyeing in presence of cationic soap. No. 2,371,536. James MacGregor to Courtaulds, Ltd.

Equipment

Liquid level comprising bubble chamber, a reservoir having an air space therein, etc. No. 2,369,802. Gregory Rylsky to Bendix Aviation Corp.

Centrifuge intended for separating blood plasma for transfusion from other constituents of whole blood. No. 2,369,822. Alan Flowers to The DeLaval Separator Co.

Inorganic fiber rope. No. 2,369,876. Richard Warren, Jr.

Electrical precipitation apparatus for removing dust particles from a stream of gas. No. 2,369,877. Harry White to Research Corp.

Apparatus for precision control of flow division for fractionating columns and the like. No. 2,369,913. Samuel Palkin, deceased, by Rose Palkin, executrix, and Stanley Hall to the United States of America, as represented by Claude R. Wickard, Secretary of Agriculture.

Electrolytic alkali chlorine cell. No. 2,370,086. Kenneth Stuart to Hooker Electrochemical Co.

Electrolytic alkali halogen cells. No. 2,370,087. Kenneth Stuart to Hooker Electrochemical Co.

In combination with float actuated liquid level indicating system, electrical means for arbitrarily positioning the float thereof, comprising electromagnetic device. No. 2,370,099. John Werder.

Contacting terminal structure for oxidation products of electrical devices. No. 2,370,104. Meyer Lazarus.

Sedimentation apparatus comprising a basin provided with a central pier surrounded at its base by a circular discharge groove, etc. No. 2,370,120. Samuel Bousman to Western Machinery Co.

Internal combustion engine valve part, subject to elevated operating temperatures above 1000° F., formed from alloy comprised of carbon, manganese, silicon, chromium, molybdenum, columbium and tantalum singly or together, and iron. No. 2,370,124. George Charlton to Eaton Manufacturing Co.

Processes and apparatus for filtering miscella and like mixtures through a filtering medium of solid oil-bearing material. No. 2,370,138. Michele Bonotto to Extractol Process, Ltd.

Electric squib comprising shell, firing assembly, flame producing mixture, said mixture comprising ignition composition consisting of selenium and a metal from lead and tin, and flame producing ingredient. No. 2,370,159. Edward Hanley to Hercules Powder Co.

RAYMOND MULTI-WALL PAPER SHIPPING SACKS

. . . are fighting for Victory on production lines everywhere, north, south, east and west, wherever crushed, granulated or powdered materials are used.

In chemical plants, ceramic and building trades, fertilizer industries, and on food produce markets you'll find *Raymond Multi-Wall Paper Shipping Sacks* solving the packing and shipping problems.

Sift-proof, dust-proof, water-resistant . . . fast to pack, easy to handle and dependable . . . CUSTOM BUILT . . . Raymond Shipping Sacks save time, labor, and protect the product all the way from packer to user.

THE RAYMOND BAG COMPANY . . . Middletown, Ohio

From Official Gazette—Vol. 571, Nos. 3, 4; Vol. 572, Nos. 1, 2 (Feb. 20-Mar. 13)—p. 577

Examining opaque plate which comprises passing beam of penetrating radiation into plate from source at one side thereof while moving said source back and forth and laterally. No. 2,370,163. Donald Hare to The Texas Co.

Device for producing a gel product from plurality of solutions. No. 2,370,200. Hubert Shabaker to Houdry Process Corp.

Device for indicating amount and character of a liquid stream. No. 2,370,210. Delber Turner to Petrolite Corp., Ltd.

Apparatus for continuous catalytic conversion of hydrocarbons by cyclic procedure involving alternately contacting active particles of catalyst with hydrocarbon vapors to convert them by endothermic reaction followed by contacting used catalyst with oxygen-containing gas to remove deposited carbonaceous material by combustion. No. 2,370,234. William Degnen, Henry Nelly, Jr. and Percival Keith to The M. W. Kellogg Co.

Device for electrolytic protection of metal surfaces in a container. No. 2,370,288. Bengt Brolinson.

Machine for impregnating fabrics with volatile liquid or with solution containing volatile liquid. No. 2,370,290. Rudolph Czeczowitzka to Texproof, Ltd.

Apparatus for coating fabric with rubber cement. No. 2,370,298. Max Engler to The General Tire & Rubber Co.

Centrifugal machine for separating liquids from solids, comprising rotor and circumferential woven wire screen within said rotor, etc. No. 2,370,315. Leo Jones and Wilmer Bath to The Sharples Corp.

Liquid treatment apparatus comprising cylindrical tank, cylindrical partition concentrically installed in said tank, forming a sludge filtration chamber inside and an annular flocculation chamber outside said partition, etc. No. 2,370,356. Ewald Kamp and Frank Prager to Graver Tank & Mfg. Co., Inc.

Electronic microscope. No. 2,370,373. Ernst Ruska and Hans Schuchmann, Helmut Ruska and Heinz Muller.

Apparatus for separating suspended matter from stream of gas by centrifugal action. No. 2,370,444. David Bowman to Western Precipitation Corp.

Apparatus for separating wax and oil. No. 2,370,454. Eddie Dons and Oswald Mauro to Mid-Continent Petroleum Corp.

Vacuum distillation process and apparatus. No. 2,370,462. John Hecker to Distillation Products, Inc.

Fractionating vacuum distillation apparatus. No. 2,370,464. Kenneth Hickman to Distillation Products, Inc.

Apparatus for extrusion of organic materials. No. 2,370,469. Charles Johnson and Roland Nydegger to E. I. du Pont de Nemours & Co.

Apparatus for testing lubricants consisting of four-ball testing apparatus in which bearing ball is rotated against three bearing balls held in a mounting. No. 2,370,606. John Morgan and Thomas Anderson to Cities Service Oil Co.

Concentration cell and temperature compensator consisting of dip type cell comprising supporting head for electrodes, etc. No. 2,370,609. John Wilson and Elwyn Mendenhall to Economics Laboratory, Inc.

Extraction apparatus comprising horizontally disposed rotatably mounted cylindrical extraction vessel, etc. No. 2,370,614. Egon Bohn to L. von Roll Aktiengesellschaft fur kommunale Anlagen.

Acetylene generator. No. 2,370,630. Clarence Baker and Malven Olson to Union Carbide & Carbon Corp.

Mass indicator of mass spectrometer adapted to indicate specific masses of ions being detected by spectrometer. No. 2,370,631. Clifford Berry to Consolidated Engineering Corp.

Apparatus for biochemical process in which starch is converted into sugar. No. 2,370,665. George Jeffreys to Nelson Littell.

Method of mass spectrometry which comprises bombarding gas sample with a pulsating electron beam to produce a pulsating ion beam, etc. No. 2,370,673. Robert Langmuir to Consolidated Engineering Corp.

Container for storing high pressure fluid medium comprising one-piece rigid seamlessly formed metallic cylinder. No. 2,370,677. Daniel Mapes to Specialties Development Corp.

Apparatus for chemical analysis comprising flat plate having recess thereon for receiving chemical reagent and specimen, a chart for super-position over said plate, etc. No. 2,370,683. Anthony Palma.

Apparatus for removing gaseous component from gaseous mixture, comprising closed circuitous path having non-horizontal portions. No. 2,370,703. Wladimir Zaikowsky to Consolidated Engineering Corp.

Liquid seal and flow gauge. No. 2,370,755. Harold Sholl, Jr. to The Brown Instrument Co.

Apparatus for applying flux and the like. No. 2,370,775. Emil Capita.

Apparatus for producing magnesium by thermal reduction. No. 2,370,812. Lloyd Pidgeon to Dominion Magnesium, Ltd.

Method and apparatus for treating drilling fluid. No. 2,370,817. James Shanley to Phillips Petroleum Co.

Catalytic reactor comprising continuous closed multiple U-tube conduit including a catalytic reaction zone, etc. No. 2,370,950. John Gibb, William Hayward and August Schutte to The Lummus Co.

Mixing and emulsifying mill. No. 2,370,978. William McLean to Geneva Processes, Inc.

Filtering emulsion of heavy liquid and light solid by introducing emulsion into centrifugal filter and rotating filter to force liquid through filter medium and to form light porous cake within filter. No. 2,370,999. August Henry Schutte.

Catalyst operation and apparatus with oxide-containing catalyst, regenerating catalyst by first treating face of catalyst by flowing oxidizing gas thereacross and then treating interior by flowing oxidizing gas through catalyst mass. No. 2,371,148. Robert Burk to The Standard Oil Co.

Machine and process for making cellulose films and the like. No. 2,371,155. Emil Czapek.

Apparatus for thorough mixing of air in a stream to provide uniform atmospheric conditions throughout cross section of stream. No. 2,371,202. Harry Whitesel to General Electric Co.

Air mixing apparatus. No. 2,371,203. Harry Whitesel to General Electric Co.

Steam generator. No. 2,371,226. George Daniels to The Babcock & Wilcox Co.

Liquefied gas storage and dispensing system, a storage tank for holding liquefied gas under pressure, a secondary chamber in heat exchanging relationship with surrounding medium, etc. No. 2,371,231. T. H. Duff.

Electrical reaction furnace heated by means of a glow discharge, comprising separable housing having inner surface of magnesium, etc. No. 2,371,278. Bernhard Berghaus and Wilhelm Burkhardt.

Controlling temperature of contact mass during regeneration by combustion to remove burnable deposits therefrom and involving passage in heat exchange relation with mass of stream of temperature control liquid which is subject to rise in temperature while absorbing heat from regeneration reactions at rates which change progressively from above to below average rate with progressive changes in intensity of their combustion reactions. No. 2,371,381. Donald Campbell and Homer Martin to Standard Oil Development Co.

Gas testing device, comprising: elongated transparent tube sealed at its ends and adapted to have ends opened for use, elongated rod in tube, etc. No. 2,371,405. William Faitoute Munn.

Means for applying hose clamps of type including a hose encircling strap. No. 2,371,439. Gustaf Gustafson.

Device for determining relative proportions of two immiscible liquids in admixture of emulsified form, comprising vertical gauge glass, sampling leg in parallel therewith, etc. No. 2,371,457. William Mendius to Sinclair Refining Co.

Catalytic conversion apparatus. No. 2,371,477. Mott Souders, Jr. and Alexander Cherniavsky to Shell Development Co.

Apparatus for testing gas permeability of molded specimen having central chamber. No. 2,371,508. Harry Dietert.

Liquid gauge tube. No. 2,371,509. Nusyn Dobrzynski.

Apparatus for rapid cooling of heated material, combination of cooling chamber having entrance for hot material at one end and discharge port at the other, cooling elements in chamber comprising series of spaced over-lapping grates, including fixed grates alternating with movable grates, etc. No. 2,371,513. Joseph Gaffney to Fuller Co.

Sensitive heat regulator for apparatus having vapor generating medium to be heated and valve-controlled heating agent for such medium, said regulator comprising elongated hollow element capable of longitudinal expansion under heat, etc. No. 2,371,516. Evelyn Edwin Griffiths.

Explosives

Pressing colloided smokeless powder through dies by means of a hydraulic press. No. 2,370,130. Leon Babcock to Hercules Powder Co.

Manufacturing colloided smokeless powder. No. 2,370,209. Bernhart Troxler to Hercules Powder Co.

Smokeless powder processing apparatus comprising a cylindrical tank, etc. No. 2,370,271. Bernhart Troxler to Hercules Powder Co.

Manufacture of completely colloided smokeless powder. No. 2,370,272. Bernhart Troxler to Hercules Powder Co.

Production of pentaerythritol tetranitrate which comprises reacting pentaerythritol with nitric acid. No. 2,370,437. Marshall Acken and John Vyverberg, Jr. to E. I. du Pont de Nemours & Co.

Explosive containing dense granules of ammonium nitrate, of 30 mesh, and as sensitizing agent fine starch nitrate powder. No. 2,371,000. Walter Snelling to Trojan Powder Co.

Food Chemicals

Smooth custard-like milk jelly, which consists of milk and a pectin which jellifying ingredients form jelly independently of presence of sugar. No. 2,369,846. Aksel Olsen and Ellis Fehlberg to General Foods Corp.

Preparing volatile, water-immiscible flavoring substance in dry stable form. No. 2,369,847. Aksel Olsen and Edward Seltzer to General Foods Corp.

Treating citrus fruit which consists in exposing fruit to flame to char outer skin and eliminate oils from skin and removing skin. No. 2,369,891. Herbert Greenlaw.

Dissolving dried finely divided starch conversion syrup solids to form a concentrated aqueous solution. No. 2,370,123. Ben Buchanan to American Maize-Products Co.

Preservation of food products against spoilage by growth of microorganisms like mold, bacteria, steps of introducing food product into non-breathing moisture-proof container, introducing into container highly volatile agent together with medium capable of lowering vapor pressure of agent, agent in its gaseous phase being bactericidal and fungicidal fumigant. No. 2,370,768. Francis Baerwald to Rosenberg Bros. & Co.

Preparing cheese by adding to milk material a tryptic enzyme material to produce development of body characteristics. No. 2,370,878. Zola Roundry and Havard Keil to Armour & Co.

Preparing cheese by adding to milk material a heat sensitive lactic acid developing organism and adding a tryptic enzyme material for developing body characteristics. No. 2,370,879. Zola Roundy and Havard Keil to Armour & Co.

Fortifying edible flour and breakfast cereal with minerals which comprises blending non-ionized salt of acid selected from anacardic acid and tetrahydroanacardic acid and a metal selected from copper, iron, and manganese with edible product. No. 2,371,189. Robert Sadtler, one-fourth to Ney Underwood, Jr. and three-fourths to Atlas Powder Co.

Forming coffee substitute which comprises mixing bran with molasses and mixing composition with poplar bark and vinegar. No. 2,371,320. Peter Scow.

Industrial Chemicals—Inorganic

Sintered product consisting of crystallized alumina in which oxide of group consisting of Cr203 and V203 is contained in solid solution, said alumina also containing titanium atoms in lattice thereof. No. 2,369,709. Henry Baumann, Jr. and Raymond Benner to The Carborundum Co.

Decoloring liquid with hydrogen peroxide. No. 2,369,757. Heinrich Schmidt.

Manufacture of manganese oxide compositions comprising forming mixture of Mn02 with ferromanganese. No. 2,370,415. Paul Pine to The Harshaw Chemical Co.

Non-metallic electric resistance material consisting of sintered mass of spinels comprising cadmium ferrite. No. 2,370,443. Karl Biefeld.

Recovery and reuse of copper sulphate from wash liquors. No. 2,370,157. William Furness to American Rayon Co., Inc.

Treatment of gas containing sulphur dioxide to separate sulphur dioxide from other gaseous compounds contained therein comprising contacting gas with absorbing liquid comprising water and a mixture of nitrogen bases. No. 2,370,020. Thomas Doumani to Union Oil Co. of California.

Regenerating catalysts used in synthesis of liquid hydrocarbons from carbon monoxide and hydrogen, comprising treating catalysts with hydrogen at temperature above that at which they have been used in the synthesis, etc. No. 2,369,956. Walter Feisst, Otto Roelen and Walter Schuff.

Recovering fluorine and silicon as compound selected from fluosilicic acid and fluosilicates which involves heating aqueous solution to produce vapors containing hydrofluoric acid, silicon tetrafluoride and water vapor, and scrubbing with water to remove fluorine and silicon. No. 2,369,791. George Moore to Tennessee Corp.

Production of trichloro acids. No. 2,370,577. Ralph Plump to The Pennsylvania Salt Manufacturing Co.

Preparation of aluminum chloride catalyst supported on carrier which comprises treating carrier with an amalgam of aluminum and mercury, heating to distill off mercury, then treating carrier with chlorine-containing gas. No. 2,370,788. George Gilbert to Standard Oil Development Co.

Recovery of zinc oxide from solid charge containing zinciferous material and carbonaceous reducing material involving heating charge as it travels through a Waelz kiln in countercurrent relation to an oxidizing gas, etc. No. 2,370,977. Clarence Lentz and George Mahler to The New Jersey Zinc Co.

Catalyst composite comprising alumina and other catalytically active substance, said composite having been prepared by adding recipitant for hydrated alumina to solution of aluminum salt and compound constituting source of other catalytically active substance, etc. No. 2,371,087. Glenn Webb and Marvin Smith to Universal Oil Products Co.

Catalyst composite comprising alumina, magnesia and catalytically active molybdenum compound. No. 2,371,088. Glenn Webb and Marvin Smith to Universal Oil Products Co.

From water-soluble to water-dispersible chemical compounds. No. 2,371,097. Frank Cahn and Benjamin Harris to The Emulsol Corp.

Preparing copper pigment composition comprising reacting solution containing water soluble alkali metal carbonate and alkali metal salt of organic aliphatic polybasic acid with inorganic soluble cupric salt. No. 2,371,483. Sidney Tuwiner and Dwight Dodge to Pehlps Dodge Corp.

Treating decolorized saccharin liquid to increase pH, which comprises contacting liquid with fuller's earth which has been heated 700° F. to 1600° F. and cooled. No. 2,371,527. William LaLande, Jr. to Porocel Corp.

Industrial Chemicals—Organic

Corrosion-preventive composition comprising neutral vehicle containing finely dispersed corrosion inhibiting amount of a free dicarboxylic acid having 16 carbon atoms. No. 2,369,640. Emmett Barnum to Shell Development Co.

Thioketones. No. 2,369,646. Leslie Brooker and Grafton Keyes to Eastman Kodak Co.

Preparing thioketones. No. 2,369,647. Leslie Brooker and Grafton Keyes to Eastman Kodak Co.

Thioketones and process for preparing them. No. 2,369,657. Leslie Brooker and Grafton Keyes to Eastman Kodak Co.

In sulphurizing an organic compound by treating with agent to introduce vattable sulphur atoms into organic compound, improvement which consists of using as sulphurizing agent a complex addition compound of aluminum chloride and sulphur monochloride. No. 2,369,666. Arthur Fox to E. I. du Pont de Nemours & Co.

Catalyst preparation method which comprises reacting anhydrous aluminum halide of Friedel-Crafts type with concentrated sulfuric acid under conditions such that hydrogen halide is liberated. No. 2,369,691. Louis Schmerling and Vladimir Ipatieff to Universal Oil Products Co.

Removing carbonaceous deposits from spent phosphate catalysts employed in dehydration of 1,3-butylene glycol which comprises heating catalyst in presence of oxygen and ammonia. No. 2,369,693. Richard Tollefson to Air Reduction Co. Inc.

Converting hydrocarbons which comprises contacting with alumina catalyst prepared by treating amalgamated aluminum metal with a weak acid thereby producing stable alumina sol adding acid of low ionization constant, thereby forming alumina hydrogel. No. 2,369,734. Llewellyn Heard to Standard Oil Co.

Nitrogenous organic compounds and their application. No. 2,369,776. Noel Cusa, Charles Salkeld and Eric Walker to Imperial Chemical Industries Ltd.

Cyclic process of preparing hydrogen peroxide by subjecting autoxidizable organic compound in liquid to alternate oxidation with oxygen and partial catalytic reduction with hydrogen in presence of a catalyst. No. 2,369,912. Georg Pfleiderer and Hans-Joachim Riedl.

Reaction products of an aldehyde and a triazole derivative. No. 2,369,948. Gaetano D'Alelio to General Electric Co.

Triazole derivatives. No. 2,369,949. Gaetano D'Alelio to General Electric Co.

Industrial preservative and disinfectant composition containing 6-nitrotrichlorotoluene and a carrier therefor. No. 2,369,959. Albert Flenner and Frank Kaufert to E. I. du Pont de Nemours & Co.

Polymerization which comprises treating mixture of butadiene and a monomer from esters and nitriles of acrylic acids in aqueous medium containing emulsifying agent, oxidant, and copper in solution. No. 2,360,010. Albert Clifford and William Wolfe to Wingfoot Corp.

Stabilized aldol-alpha-naphthylamine and zinc stearate. No. 2,370,011. Earle Comstock to R. T. Vanderbilt Co. Inc.

Improving fibrous material and material treated by such process. No. 2,370,031. Charles Graenacher, Richard Sallmann and Jost Frei to Society of Chemical Industry in Basle.

Esterifying aliphatic alcohol boiling below 100° C. and acid to produce an ester having higher boiling point. No. 2,370,055. John Long to Wingfoot Corp.

Separation of unsaturated aliphatic hydrocarbons from solutions thereof in ammonia. No. 2,370,063. Howard Nutting and Lee Horsley to The Dow Chemical Co.

Separating butadiene from mixture with more saturated hydrocarbon having four carbon atoms in molecule, which consists in forming mixture of acetaldehyde with hydrocarbons to be separated and fractionally distilling. No. 2,370,064. Howard Nutting and Lee Horsley to The Dow Chemical Co.

Manufacture of biuret. No. 2,370,065. John Olin to Sharples Chemicals Inc.

Organic amine derivatives and method of obtaining same. No. 2,370,092. Edward Tillitson to Parke, Davis & Co.

Liquid dielectric composition consisting of non-crystallizing normally liquid polychlorinated monortho-nitrodiphenyl mixture obtained by direct chlorination of mono-ortho-nitrodiphenyl. No. 2,370,113. Russell Jenkins to Monsanto Chemical Co.

Increasing temperature of conducting and non-conducting organic and inorganic matter which comprises placing such matter within closed conducting resonant chamber, connecting ultra high-frequency oscillation, generator to chamber, etc. No. 2,370,161. William Hansen to The Board of Trustees of The Leland Stanford Junior University.

Alkylating saturated aliphatic hydrocarbon having tertiary carbon atom by reaction with alkylating agent in presence of alkylation catalyst. No. 2,370,164. Isaac Hemphill to Shell Development Co.

Preparation of nitrolic acids and pseudonitroles. No. 2,370,185. Edwin Nygaard, John McCracken and Thomas Noland to Socony-Vacuum Oil Co. Inc.

Catalytic agent of Friedel-Crafts type consisting of molten mixture comprising aluminum halide, metal halide which does not react with aluminum halide and hydrogen halide. No. 2,370,195. William Ross, Sumner McAllister and John Anderson, to Shell Development Co.

Arylene thiazyl sulphenamides. No. 2,370,253. William Messer to United States Rubber Co.

Treating acid-tar formed in washing crude benzol with sulphuric acid. No. 2,370,277. Frans Wethyl to Fuel Refining Corp.

Preparing pseudocumidine, which comprises heating N-N-dimethyl-meta-toluidine with zinc chloride. No. 2,370,339. Walter Wirth and John Vaughen to E. I. du Pont de Nemours & Co.

Purification of styrene which comprises adding to monomeric styrene containing oxidation products of styrene, a small quantity of an amine. No. 2,370,346. Earl Gluesenkamp to Monsanto Chemical Co.

Aqueous herbicidal solution containing a water-soluble arsenite and a water-soluble pentachlorophenate. No. 2,370,349. Francis Hance.

Manufacturing conjugated diolefins from hydrocarbon fraction boiling within 150° to 290° F. from which aromatics have been removed. No. 2,370,412. Rupert Morris and Robert Moore to Shell Development Co.

Manufacture of alkanoic acids which comprises interacting isoparaffin hydrocarbon and unsaturated aliphatic carboxylic acid in presence of catalyst of Friedel-Crafts type. No. 2,370,494. Louis Schmerling to Universal Oil Products Co.

Manufacture of nitrosyl chloride adducts of organic compounds containing non-aromatic C=C linkage. No. 2,370,518. Herman Beekhuis, Jr. to The Solvay Process Co.

Manufacturing ortho-nitro-anisole by heating alkaline methanol solution of ortho-nitro-chloro-benzene to methoxylation temperature in presence of sodium hydroxide. No. 2,370,524. Mortimer Denison and Mason Wassom to E. I. du Pont de Nemours & Co.

Purification of titanium tetrachloride which comprises dissolving heavy metal soap therein and subjecting liquid to action of hydrogen sulfide. No. 2,370,525. Bernard DeWitt to Pittsburgh Plate Glass Co.

Methyl vinyl carbonate. No. 2,370,549. Frederick Kung to Pittsburgh Plate Glass Co.

Separating and recovering 2,3,5-trimethyl phenol from alkyl phenol mixtures containing it. No. 2,370,554. Daniel Luten, Jr. and Samuel Thomas to Shell Development Co.

Mono-nitration of aromatic compound selected from benzene, toluene and chlorobenzene. No. 2,370,558. Joseph Mares to Monsanto Chemical Co.

Preparing ester of carbonic acid which comprises reacting unsaturated haloformate with polyhydric alcohol in presence of basic reagent. No. 2,370,567. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

Bischloroformate of a polyglycol. No. 2,370,568. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

Preparing polyglycol bis (unsaturated alcohol carbonate). No. 2,370,569. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

Methallyl chloroformate. No. 2,370,570. Irving Muskat to Pittsburgh Plate Glass Co.

Preparing glycol bis (unsaturated alcohol carbonate). No. 2,370,571. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

Derivative of carbonic acid wherein each acid group of carbonic acid is esterified with half ester of a glycol and a monocarboxylic acid. No. 2,370,572. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

Neutral ester of (A) hydroxy ester of glycolic acid and unsaturated monohydroxy alcohol and (B) acid ester of carbonic acid and monohydroxy alcohol. No. 2,370,573. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

Bis (carbalkenyloxymethyl) carbonate. No. 2,370,574. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

Manufacture of succinic acid. No. 2,370,579. Elton Punnett to Allied Chemical & Dye Corp.

Aminodioxanes. No. 2,370,586. Murray Senkus to Commercial Solvents Corp.

Isopropyl peroxycarbonate. No. 2,370,588. Franklin Strain to Pittsburgh Plate Glass Co.

Vinyl alkenyl carbonate. No. 2,370,589. Franklin Strain and Frederick Kung to Pittsburgh Plate Glass Co.

Reacting organic mercapto compound with substance selected from aurous cyanide and alkali metal aurocyanides, to form corresponding auro thio compound. No. 2,370,592. Nelson Trenner and Frederick Bacher to Merck & Co. Inc.

Dihydro-beta-erythroidine, and salts and hydrohalides thereof. No. 2,370,651. Karl Folkers and Frank Koniuszy to Merck & Co. Inc.

Separating mixture of 2,3,6-trimethyl phenol and 2-methyl-4-ethyl phenol comprising sulfonating to produce monosulfonic acids of said phenols without forming polysulfonic acids, etc. No. 2,370,719. Aldo De-Benedictis and Daniel Luten, Jr. to Shell Development Co.

Monosulphide of a 3,4 dialkyl monohydric phenol. No. 2,370,756. Robert Sibley to Monsanto Chemical Co.

Preparing 2-methyl-4-keto-1,3-dioxolane which comprises bringing acetylene in contact with hydroxyacetic acid in anhydrous medium comprising catalyst prepared from mercuric sulfate, mercuric oxide and sulfuric acid and acetic anhydride. No. 2,370,779. Rollin Conaway to E. I. du Pont de Nemours & Co.

Substituted alkyl phosphate of at least 4 carbon atoms containing sulphonyl chloride group in hydrocarbon nucleus thereof. No. 2,370,786. Arthur Fox to E. I. du Pont de Nemours & Co.

Preparing condensation products which comprises heating in presence of catalyst, a monomeric organic polyol, an organic compound having six carbon atoms and a labile hydrogen atom, and a bifunctional heteromonocyclic urea derivative. No. 2,370,839. William Burke and James Werntz to E. I. du Pont de Nemours & Co.

Detecting available chlorine content of aqueous liquid by detection of depolarization of polarized cathode exposed to liquid, the improvement

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by which to detect sum of hypochlorous and chloramine chlorine. No. 2,370,871. Henry Marks to Wallace & Tiernan Products, Inc.

Production of magnesium by thermal reduction of magnesia-containing material with ferrosilicon. No. 2,370,898. Leslie Whiton and Hugh Weld to Dominion Magnesium Ltd.

Separation by distillation of styrene without polymerization of styrene because of heat, said styrene being admixed with close-boiling monopolymerizable aromatic compounds, which boil slightly below boiling point of styrene. No. 2,370,948. Truman Gadwa to The Lummus Co.

Producing catalysts, comprising suspending silica particles coated with material selected from hydroxides, carbonates and sulfates of alkali metals in stream of gas, etc. No. 2,371,069. Robert Ruthruff.

Dithiobiuret and method of preparation. No. 2,371,112. Russell Sperry to American Cyanamid Co.

Preparing monothiobiuret which comprises heating together member of group consisting of guanyl urea and guanyl urea carbonate, and hydrogen sulfide. No. 2,371,113. Russell Sperry to American Cyanamid Co.

Manufacture of a hydrazine derivative containing hydroxyalkyl radicals which comprises condensing stearic acid hydrazide with glycidol and condensing product obtained with ethylene oxide. No. 2,371,133. Charles Graenacher, Richard Sallmann and Jost Frei to Society of Chemical Industry in Basle.

Producing lignin sulphonate compounds free from non-ligneous organic impurities and being acid-insoluble and alkali-dispersible. No. 2,371,136. Carlyle Harmon to Marathon Corp.

Sulphanilyl carbamic acid derivatives and their manufacture. No. 2,371,178. Henry Martin and Alfred Staub to J. R. Geigy A. G.

Conducting catalytic hydrocarbon conversion reactions in which fixed bed of catalyst is employed and in which hydrocarbon reactants and regeneration gas are alternately fed to bed of catalyst. No. 2,371,181. Roger Newton to Houdry Process Corp.

Multi-stage continuous ethanol fermentation. No. 2,371,208. Francisco Alzola.

Alumina gel catalysis. No. 2,371,237. Llewellyn Heard and Rodney Shankland and James Baillie to Standard Oil Co.

Manufacture of alkali metal salt of pantothenic acid. No. 2,371,245. John Lee and Stephen Heineman.

Preparation of sulphated fatty acid esters. No. 2,371,284. Alton Cook and Curt Tjorn and Joseph Zaparanick to Arkansas Co. Inc.

Recovering hydrofluoric acid from homogeneous mixture containing hydrocarbons boiling below 100° F. and hydrofluoric acid, which comprises contacting with olefinic oil boiling above 300° F. No. 2,371,341. Maryan Matuszak to Phillips Petroleum Co.

Composition for dustproofing coal comprising calcium chloride and alkali metal sulfate of an organic alcohol selected from branched-chain primary and secondary alcohols. No. 2,371,344. John Miller to Solvay Sales Corp.

Unsaturated aliphatic hydrocarbon having 4 to 6 carbon atoms in molecule is separated from mixture with more saturated aliphatic hydrocarbon containing same number of carbon atoms by fractionally distilling mixture in presence of anhydrous ammonia to form low boiling azeotrope with more saturated hydrocarbon. No. 2,371,350. Howard Nutting and Lee Horsley to The Dow Chemical Co.

Manufacture of nitrosyl chloride adducts of organic compounds containing non-aromatic C= linkage, which comprises reacting organic compound with NOCl in reaction mixture containing normal alkali-metal carbonate to limit amount of organically bound chlorine in adduct. No. 2,371,418. Leland Beckham and John Crowder to The Solvay Process Co.

Certain water-soluble high molal oxyalkylated esters, and method of making same. No. 2,371,429. Melvin DeGroote and Bernhard Keiser to Petrolite Corp. Ltd.

Purifying crude aqueous lecithin emulsions containing water which comprises extracting aqueous emulsion with ethylene dichloride. No. 2,371,476. Robert Sifferd to Armour & Co.

Production of cyanamide reaction products which comprises heating dispersions of compound in liquid ammonia in closed pressure vessel, internal surfaces of which consist of a high chrome steel of: chromium, carbon, iron, nickel, stabilizer; said stabilizer being molybdenum, columbian or titanium. No. 2,371,480. Robert Swain and Joseph Paden to American Cyanamid Co.

Separation of ammonium chloride and aliphatic amine hydrochlorides from mixtures of the same with copper chloride, which consists in treating solution with aryl-amine compound. No. 2,371,543. Noland Poffenberger and Ray Holmes to The Dow Chemical Co.

Producing alkylated phenols which comprises reacting phenol with olefinic hydrcarbon in presence of catalyst comprising acid phosphate of alkaline earth metal. No. 2,371,550. Raymond Schaad to Universal Oil Products Co.

Preparation of methyl vinyl ketone. No. 2,371,577. William Hale and Leland Underkofler to National Agrol Co. Inc.

Treating filamentary material comprising providing stream of superheated liquid under pressure flowing in one general direction throughout its length, etc. No. 2,371,579. Paul Cole and Alvin Lodge to American Viscose Corp.

Fine Chemicals

Making furfural and organic acids, which comprises subjecting pentosan material and normally non-caking tarry material to high temperature and pressure in presence of a furfural-forming catalyst. No. 2,369,655. Robert Boehm to Masonite Corp.

Basic acylated cyclic diamine. No. 2,369,817. Melvin DeGroote and Bernhard Keiser and Charles Blair, Jr. to Petrolite Corp. Ltd.

Water-soluble esterification product derived by reaction between polybasic compound and substituted oxyalkylated imidiazoline. No. 2,369,818. Melvin DeGroote and Bernhard Keiser to Petrolite Corp. Ltd.

Pantothenamide-inorganic salt complex, the metal of said salt being selected from non-toxic di- and trivalent metals. No. 2,369,839. Marjorie Moore to Abbott Laboratories.

Octadecanoylhexadecylethenone. No. 2,369,919. John Sauer to E. I. du Pont de Nemours & Co.

2-Ethyl-2-(beta-cyanoethyl)-3-hexenal.1. No. 2,370,006. Herman Bruson and Thomas Riener to The Resinous Products & Chemical Co.

Derivatives of tertiary amino aliphatic acids. No. 2,370,015. Otto Dalmer, Claus Diehl and Hartmann Pieper to Merck & Co. Inc.

Mandelic acid ester of N-methyl-piperidinol-4 and its salts prepared for use as a mydriatic. No. 2,370,114. Carl Klemme and Richard Baltzly to Burroughs Wellcome & Co. Inc.

Beta-carbamylethyl nitro-paraffin, in which beta-carbamylethyl group is attached to carbon atom contiguous to nitro group. No. 2,370,142. Herman Bruson to The Resinous Products & Chemical Co.

Monoglycolic acid ethers of cyclohexylidene diphenols. No. 2,370,256. Joseph Niederl.

Manufacture of halogeno-ketones, of group consisting of 5-chloro-pentanone-2, 5-bromo-pentanone-2 and 5-iodo-pentanone-2. No. 2,370,392. William Boon to Imperial Chemical Industries Ltd.

Nuclear chlorinated p-phenylene diacetic acid. No. 2,370,394. Oliver Cass to E. I. du Pont de Nemours & Co.

2-Nitro-1-chloromethoxyalkanes. No. 2,370,540. Edward Hodge to Commercial Solvents Corp

Reacting mercapto compound of formula R-SH where R is aryl radical, with substance selected from aurous cyanide and alkali aurocyanides, to form corresponding auro thio compound. No. 2,370,593. Nelson Trenner and Frederick Bacher to Merck & Co. Inc.

Manufacture of tetrahydro trihydroxy-abietic acid, comprising causing reducing agents capable of replacing halogen by hydrogen to act on a halogen-trihydroxyabietic acid. No. 2,370,900. Alfred Winterstein to Hoffman-La Roche, Inc.

Preparing alpha-d-galacturonic acid from pectin. No. 2,370,961. Charles Hollander to Rohm & Haas Co.

Preparing ester of lactyllactic acid comprising reacting dry lactide with anhydrous alcohol in presence of acid catalyst. No. 2,371,281. Houston Claborn, dedicated to the free use of the People of the United States.

Alkylating tertiary hydrocarbons. No. 2,371,408. Paul Parker to Standard Oil Dveelopment Co.

4,4'-di-(2,3-epoxy-propoxy) benzophenone, crystalline compound melting at 182° C. No. 2,371,500. Edgar Britton and Harold Slagh to The Dow Chemical Co.

Producing 1,3-butadiene by dehydration of 1,3-butylene glycol. No. 2,371,530. Arthur Lorch to Air Reduction Co. Inc.

Metals, Alloys

Solid metal corrodible by salt solution coated with a corrosion-preventive film formed by a free dicarboxylic acid having at least 16 carbon atoms. No. 2,369,641. Emmett Barnum to Shell Development Co.

Alloy Steel, characterized by extremely shallow hardening properties, and containing carbon, arsenic, aluminum added in melting, manganese and iron. No. 2,369,656. Janet Briggs to Crucible Steel Co. of America.

Improvements in plating of metals which comprise electrolytically depositing coating of tin on ferrous strip, and then passing metal coated strip thru vapor of petroleum hydrocarbon until coating of tin is raised to temperature above its melting point by condensation of hydrocarbon vapor on tin surface. No. 2,369,748. John Nachtman.

Treating elongated alloy steel stock of difficult-to-draw types which are hardenable thermally, or by mechanical working. No. 2,369,805. William Schultz to Crucible Steel Co. of America.

Wrought brass tube, in which brass contains arsenic and antimony, characterized by forming on its surfaces subjected to corrosive waters an adhering, self-healing, corrosion resistant film protecting surfaces against both dezincification and erosion corrosion. No. 2,369,813. Richard Wilkins to Revere Copper & Brass, Inc.

Liquid composition for depositing protective film upon metals, comprising a base and a volatile solvent therefor; said base having neutral semi-solid polar fatty compound of unctuous consistency and of cation properties and having acid portion of molecules consisting of water-insoluble aliphatic acid, and a tertiary amine for preventing far-reaching direct esterification of said higher acid. No. 2,369,946. Jacob Maurice Cohen.

Making bimetal bond comprising integrally bonding non-ferrous metal to iron base and forming a composite unit capable of withstanding hot and cold working without separation. No. 2,370,108. Robert Pike.

Steel alloy casting having matrix consisting of spheroidized pearlite and having all of free carbon in form of minute particles of temper carbon embedded in matrix, said casting comprising carbon, silicon, manganese, and iron. No. 2,370,179. Russell McCarroll and Gosta Vennerholm to Ford Motor Co.

Annealable white iron casting containing bismuth, bismuth being present to obstruct formation of flake graphite during solidification of casting. No. 2,370,225. Alfred Boegehold to General Motors Corp.

Electric contact formed of particles of refractory metal selected from tungsten and molybdenum, and coating on said particles selected from palladium, platinum and rhodium and copper, silver and gold interspersed with and bonded to said coated particles. No. 2,370,242. Franz Hensel and Earl Larsen to P. R. Mallory & Co. Inc.

Alloy for addition to iron or steel, containing one element of titanium and zirconium, one of aluminum and magnesium, silicon, one element of alkaline earth metals and alkali-metals, one of tantalum, uranium, molybendum, tungsten and manganese. No. 2,370,289. Henry Chandler to Vanadium Corp. of America.

Magnesium-base alloys containing manganese, and magnesium. No. 2,370,320. Cresa Moss to Chicago Development Co.

Production of stainless steel of appreciable nitrogen contents. No. 2,370,364. Donald Loveless to Rustless Iron & Steel Corp.

Alloy composition characterized by high temperature oxidation resistance, corrosion and erosion resistance with high hardness and high tensile strength as well as low creep value, consisting of Cr, Fe, one of Ta and Cb, Mn, carbon, with balance consisting of Ni and Co. No. 2,370,395. Hugh Cooper.

Steel powder in which particles are fritted agglomerates formed by heat treatment of loose powder mass of finer soft iron particles with finer ferrous alloy particles containing combined carbon. No. 2,370,396. Joseph Cordiano to Hardy Metallurgical Co.

Lead alloy for use as filling metal comprising antimony, arsenic, copper, tin and lead. No. 2,370,439. George Beard to National Lead Co.

Anodizing multiplicity of aluminum articles. No. 2,370,463. William Herrick, twenty-five per cent to Percival Whittlesey and twenty-five per cent to Benton Blair.

Treating metalliferous material in zone heated by discharge of electric current through gap. No. 2,370,467. Robert Hopkins to M. W. Kellogg Co.

Additional patents on metals and alloys, medicinals, photographic chemicals, resins and plastics, rubber, textiles, paints and pigments, paper and pulp, petroleum chemicals, petroleum refining, water sewage and sanitation from the above volumes will be given next month.

Abstracts of Foreign Patents

Collected from Original Sources and Edited

Those interested in obtaining further information concerning the patents reported below should communicate with the Patent Department, CHEMICAL INDUSTRIES. Photostated copies of Canadian patents are available from the Commissioner of Patents, Ottawa, Canada.

CANADIAN PATENTS

Granted and Published Jan. 23, 1945 (Continued)

Two-stage process for the synthetic production of a motor fuel, by alkylation and distillation. No. 425,283. Anglo-Iranian Oil Co. Ltd. (Albert Ernest Dunstan, Francis Eric Austin Thompson)

Preparation of hard tablet from the expressed juices of fruit or vegetables involving degradation of pectin. No. 425,291. Bruce's Juices Inc. (John A. Bruce)

Oil-modified, heat-hardenable, resin composed of reaction products of cresol, formaldehyde, castor, and oiticica oils, in the presence of monoamylamine. No. 425,294. Canadian General Electric Co. Ltd. (Herman L. Hersh)

Diazine derivative. No. 425,297. Canadian General Electric Co. Ltd. (G. F. D'Alelio, James W. Underwood)

Blasting assembly adapted for use at elevated pressures in the presence of liquids, which contains at least 50% by weight ammonium nitrate. No. 425,299. Canadian Industries Ltd. (Melvin A. Cook)

Film spool design. No. 425,300. Canadian Kodak Co. Ltd. (Harlow D. Philips)

Production of fuel from water-saturated waste woody material, by pressing impregnation with sulfite liquor, and re-pressing. No. 425,304. Consolidated Paper Corporation Ltd. (Horace Freeman)

Chemically resistant, gas expanded, cellular product having substantially modulus and elasticity of soft vulcanized caoutchouc rubber, composed of hard vulcanized rubber, and elastic polymer of purely aliphatic mono-olefine. No. 425,312. Dominion Rubber Co. Ltd. (Wills Alexander Gibbons)

Oxidation of aromatic ester of sterol, reducing to the 7-hydroxy-3-mono ester and converting the latter into a diester. No. 425,313. E. I. du Pont de Nemours & Co. (Hans Reinhard Rosenberg)

Preparation of beta-alkoxy mono-carboxylic acid by reacting a lactone of a beta-hydroxy monocarboxylic acid, having at least one hydrogen atom on the alpha carbon atom, with a monohydric alcohol. No. 425,318. The B. F. Goodrich Company (Frederick E. Kung)

Method of fixing water soluble vitamin upon the grain of hulled rice. No. 425,321. Hoffman-La Roche Ltd. (Max Frank Furter)

Method of fixing a water soluble vitamin of rice hulls by dextrin-glucoe bonding. No. 425,322. Hoffman-La Roche Ltd. (Max Frank Furter)

Manufacture of wood laminae by thermoplastic impregnation and bonding. No. 425,323. Hordern-Richmond Aircraft Ltd. (A. A. D. Lang)

Delayed-hardening urea-formaldehyde resin composition containing magnesium oxide, hydroxide, or zinc oxide, hydroxide, and ammonium salt of strong acid. No. 425,335. Libby-Owens-Ford Glass Co. (Wm. C. Dearing)

Getter design for electron tubes. No. 425,343. Philips Lamps Ltd. (Ronald Austin Stephen)

Rubber process manufacture comprising mixing rubber with large amount of carbon black and a primary amido derivative of carbonic acid, heating to severely flocculate the black, and masticating to disperse black. No. 425,366. United States Rubber Co. (Roscoe Harlan)

High sensitivity and high electrical resistance bi-metal composed of bonded nickel-steel of Invar type, and Mn-Cu-Ni alloy. No. 425,368. The H. A. Wilson Co. (Victor George Mooradian)

Corrosion-resistant alloy comprising: Ag, 50 to 85 parts; Palladium, 5 to 25 parts; nickel, 0.1 to 5 parts; copper, 0.3 to 25 parts. No. 425,370. Heiman Padova, Avinoam Padova.

Treatment of regenerated cellulose yarns by impregnation with 30 to 75 per cent by weight alkali metal hydroxide, neutralizing immediately after treatment with acid, and washing. No. 425,373. Henry Dreyfus (Wm. John Simpson)

Granted and Published February 6, 1945

Furnace melt stirring apparatus. No. 425,374. Jack Sydney Gerber, Wm. Ducket Redfern.

Fluxing agent for use in open hearth manufacture of iron and steel compcsed of briquettes of limestone and aluminum oxide yielding material in stated ratio. No. 425,375. James J. Bowden, John S. Suda

Gold extraction from previously roasted ore containing gold telluride involving leaching with solvent containing free ammonia, alkali cyanide, and divalent copper solution. No. 425,376. Colin G. Fink, Garth L. Putnam.

Extraction of gold from ore by leaching with solvent prepared by adding free chlorine to a solution containing a bromide and a large excess of chloride salt. No. 425,377. Colin G. Fink, Garth L. Putnam.

Bulk treatment of coal with 35-35% solids urea-formaldehyde aqueous solution to produce adherent weather and water resistant coating thereover. No. 425,382. Leopold F. Bornstein.

Manufacture of fuel briquettes by pressure and high temperature treatment of starch-bearing cereal with sodium hydroxide and water, and utilizing same as bonding agent for fuel particles. No. 425,388. John A. Erickson.

Flame resistant, moistureproof material, limp and pliable at extremely low temperatures, composed of fabric coated and impregnated with chlorinated wax, tricresyl phosphate, dibutylphthalate, magnesium silicate, antimony oxide and benzine. No. 425,400. Dominion Oilcloth and Linoleum Co. Ltd. (Charles F. Martin)

Combined retaining strip and label. No. 425,425. The Cameo Metal Seal & Label Co. Ltd. (Hyman Kendall)

Recovery of phenols from tall oil by caustic extraction. No. 425,427. Colgate-Palmolive-Peet Co. (John Ross, Joseph Henry Percy)

Production of polymers of styrene, of molecular weight greater than 1500, by subjecting styrene solution to action of activated bleaching earth, and activated clay, or silica gel, at 20-90 Cent. No. 425,435. The Distillers Company Ltd. (Herbert Muggleton Stanley, Francis Edward Salt)

Production of styrene-type polymerization product, by partial polymerization, incorporating an ester of crotonic acid, and completing polymerization of the admixture. No. 425,436. The Distillers Company Ltd. (Hanns Peter Staudinger)

Method of piercing holes in mineral material, by melting, disintegrating slag, and removing such slag. No. 425,437. Dominion Oxygen Co. Ltd. (Charles J. Burch)

Method of manufacture of heat exchange tube. No. 425,440. Dominion Rubber Co. Ltd. (Edward Hamilton Wallace)

Production of dense mineral fiber mats by preheating to almost softening point of fibers, then passing current of heated air through mat in opposite direction to soften fibers, and compressing. No. 425,441. Fiberglas Canada Ltd. (Howard W. Collins)

Silver-coating glass mirrors by spraying with dispersed mixture of separately formed silvering and reducing solutions, wherein the reducing agent is hydrazine sulphate, hydrazine nitrate or hydrazine hydrate. No. 425,446. Hobbs Glass Ltd. (Charles Avery Trevail, Kurt Paul Gladney)

Method of increasing viscosity of gelatinous material by addition thereto of deacetylated chitin. No. 425,450. Industrial Patents Corporation (Edward F. Christopher)

Self-hardening, stable, dry mixture composed of hardenable water-soluble urea-formaldehyde, ammonium sulphate, and barium chloride. No. 425,457. Libbey-Owens-Ford Glass Co., assignee of Plaskon Co. Inc. (Arthur M. Howald, Wm. C. Dearing)

Process for the production of 4,4'-diamidino-stilbene. No. 425,462. May & Baker Ltd. (Arthur James Ewins, Julius Nicholson Upminster)

Resultant product obtained by mixing insulin and a protamine, and the process of bringing insulin and clupeine together. No. 425,498. Governors of the University of Toronto (Hans Christian Hagedorn, Ingrid Wodstrup-Nielsen, Birger Norman Jensen)

Production of high yield of crystalline insulin from suspension of non-crystalline insulin containing one metal of the class of zinc, cobalt, nickel and cadmium. No. 425,499. Governors of the University of Toronto (David Alymer Scott)

Process of making prolonged-action insulin preparation which includes adding zinc to the insulin in excess of that present in zinc insulin crystals. No. 425,500. Governors of the University of Toronto (David Alymer Scott, Albert Madden Fisher)

Method of producing insulin-protamine composition with admixture of zinc. No. 425,501. Governors of the University of Toronto (David Alymer Scott, Albert Madden Fisher)

Resilient material adapted to form a pressure seal, composed of cellulose fibers, hygroscopic material, and unplasticized cellulose derivative. No. 425,517. Camille Dreyfus (George Schneider, Mervin E. Martin)

Granted and Published February 13, 1945

Improvement in gold-cyanidation process involving absorption of dissolved gold cyanide in carbonaceous material. No. 425,524. Thomas Garfield Chapman.

Method of proofing asbestos against water, oil, and gasoline by treating with boiled drying oil, and unboiled drying oil, organic solvent, and water-insoluble metallic soap. No. 425,527. Alfred Michael Cowan.

Preparation of antidiabetic material by treatment of pancreas principle with hexamine. No. 45,534. Raymond A. Warburton.

Electrodeposition method and apparatus. No. 425,546. Canadian General Electric Co. Ltd. (William K. Kearsley)

Suppository containing chlorophyll in therapeutically effective amounts—i.e. about one per cent. No. 425,561. Lakeland Foundation (Benjamin Gruskin)

Process for the manufacture of ring-saturated, side-chain unsaturated hydroxy steroids. No. 425,570. Parke, Davis & Co. (Russell Earl Marker)

Preparation of stigmastenone by reacting stigmasterol and precipitated copper at elevated temperature, distilling, and crystallizing distillate. No. 425,571. Parke, Davis & Company (Russell Earl Marker)

Process for the manufacture of androstenediol and derivatives thereof. No. 425,576. Society of Chemical Industry in Basle (A. Wettstein, H. Kaegi)

Process for the manufacture of new enol derivatives of 3 keto-cyclopentano—10:13-dimethyl-phenanthrene. No. 425,577. Society of Chemical Industry in Basle (Werner Fischer)

Manufacture of estradiol-di-ethyl carbonate by reaction of estradiol, with carbonic acid-ethyl ester and phosgene with ethanol. No. 425,578. Society of Chemical Industry in Basle (Karl Miescher, Caesar Scholz)

(To be continued)

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

412,463. Servicised Products Corp., Chicago, Ill.; filed Dec. 16, 1942; Serial No. 457,453; for sealing compounds; since Mar. 5, 1941.

412,495. Evercrete Corp., New York, N. Y. Filed Dec. 5, 944; for liquid waterproofing and protective coating for masonry.

455,833. Swiss Serum & Vaccine Institute, Berne, Switzerland; filed Sept. 28, 1942; for chemical products; since Feb. 1942.

466,984. The Elco Grease & Oil Co., Cleveland, Ohio; filed Jan. 29, 1944; for greases; since July 1, 1936.

467,627. United States Gypsum Co., Chicago, Ill.; filed Feb. 21, 1944; for quicklime; since May 4, 1938.

468,241. The Firestone Tire & Rubber Co., as Firestone Industrial Products Co., Akron, Ohio; filed Mar. 13, 1944; for foamed sponge material; since Feb. 4, 1944.

468,439. Corning Glass Works, Corning, N. Y.; filed Mar. 20, 1944; for distilling heads; since Apr. 30, 1943.

468,599. Dennis Chemical Co., St. Louis, Mo.; filed Mar. 24, 1944; for water-proof adhesive; since Sept. 1, 1942.

469,191. The Dow Chemical Co., Midland, Mich.; filed Apr. 10, 1944; for herbicide; since Dec. 13, 1943.

469,752. The Elco Lubricant Corp., Cleveland, Ohio; filed Apr. 28, 1944; for lubricating oils; since Apr. 3, 1935.

470,867. Frank J. Sowa, as Sowa Chemical Co., N. Y.; filed June 2, 1944; for organo-silicon compounds; since Mar. 31, 1944.

471,788. Laurie H. Bullock, as L. H. Bullock Co., Berkeley, Calif.; filed June 29, 1944; for flame proofing composition; since June 1, 1943.

472,188. Eastman Kodak Co., Jersey City, N. J., and Rochester, N. Y.; filed July 13, 1944; for photo paper; since Feb. 17, 1930.

472,494. American Coatings Corp., Brooklyn, N. Y.; filed July 22, 1944; for floor enamel; since March 1943.

472,510. The Dayton Rubber Mfg. Co., Dayton, Ohio; filed July 22, 1944; for rubber composition; since 1934.

472,696. E. I. du Pont de Nemours & Co., Wilmington, Del.; filed July 28, 1944; for photographic film; since Jan. 2, 1942.

473,115. Philco Corp., Philadelphia, Pa.; filed Aug. 9, 1944; for polish, since 1934.

473,335. Quaker Chemical Products Corp., Conshohocken, Pa.; filed Aug. 16, 1944; for esters of oily nature; since Feb. 13, 1941.

473,579. Reichhold Chemicals, Inc., Detroit, Mich.; filed Aug. 24, 1944; for processed oils; since June 30, 1943.

473,885. The Firestone Tire & Rubber Co., as Firestone Industrial Products Co., Akron, Ohio; filed Sept. 4, 1944; for artificial leather; since Aug. 22, 1944.

474,027. The Foxboro Co., Foxboro, Mass.; filed Sept. 9, 1944; for electronic instruments; since June 6, 1944.

474,138. Leo A. Sauer, as V-O Mfg. Co., Glendale, Calif.; filed Sept. 12, 1944; for motor oil; since Nov. 15, 1940.

474,167. Industrial Tape Corp., Brunswick, N. J.; filed Sept. 13, 1944; for plastic coated mending tape; since Apr. 19, 1944.

474,223. Carsello Chemical Products, Chicago, Ill.; filed Sept. 15, 1944; for coating floors; since June 1, 1940.

474,434. Watford Chemical Co. Ltd., London, England; filed Sept. 20, 1944; for emulsifying agents; since Sept. 15, 1942.

474,500. Norman Paint Co., Washington, D. C.; filed Sept. 22, 1944; for flat wall paint; since 1935.

474,529. David Birk, as Birk Paint Co., Jersey City, N. J.; filed Sept. 23, 1944; for paints; since Apr. 1, 1944.

474,725. The Hardesty Chemical Co. Inc., N. Y.; filed Sept. 29, 1944; for products of castor oil; since June 1, 1944.

474,771. Hans P. Wagner, as Wagum Distributing Co., Akron, Ohio, and Atlanta, Ga.; filed Sept. 30, 1944; for synthetic rubber; since Nov. 15, 1943.

474,779. The Chief Chemical Corp., N. Y.; filed Oct. 2, 1944; for titration apparatus; since April 1, 1944.

474,889. The Emulsol Corp., Chicago, Ill.; filed Oct. 4, 1944; for bactericidal detergents; since Sept. 4, 1941.

475,398. Shell Oil Co. Inc., San Francisco, Calif.; filed Oct. 17, 1944; for corrosion preventive oils; since Mar. 27, 1944.

475,399. Snowden Chemical Co., Modesto, Calif.; filed Oct. 17, 1944; for dry fire extinguishers; since June 15, 1944.

475,400. Snowden Chemical Co., Modesto, Calif.; filed Oct. 17, 1944; for chlorpicrin, etc.; since Sept. 1, 1944.

475,561. E. I. du Pont de Nemours & Co., Wilmington, Del.; filed Oct. 21, 1944; for dimethylolurea; since Sept. 29, 1944.

475,658. Marathon Corp., Rothschild, Wis.; filed Oct. 24, 1944; for dispersing agents; since Oct. 10, 1944.

476,123. U. S. Industrial Chemicals, Inc., N. Y.; filed Nov. 4, 1944; for insecticides; since Oct. 18, 1944.

476,222. Porocel Corp., Philadelphia, Pa.; filed Nov. 7, 1944; for catalyst of bauxite; since Mar. 1, 1944.

476,223. Porocel Corp., Philadelphia, Pa.; filed Nov. 7, 1944; for activated bauxite; since Mar. 20, 1939.

476,380, 476,381. Wyandotte Chemical Corp., Wyandotte, Mich., filed Nov. 11, 1944; for addition to foaming liquids; since Apr. 1, 1944; since July 17, 1944.

476,476. Monsanto Chemical Co., St. Louis, Mo.; filed Nov. 15, 1944; for synthetic resins; since Oct. 18, 1944.

477,048. American Instrument Co., Silver Spring, Md.; filed Nov. 30, 1944; for periodical; since Nov. 10, 1944.

477,350. Brown Co., Berlin, N. H.; filed Dec. 9, 1944; for pulp; since Nov. 10, 1944.

477,379. Testworth Labs. Inc., Chicago, Ill.; filed Dec. 9, 1944; for adhesive rubber cement; since July 10, 1942.

477,380. Testworth Labs. Inc., Chicago, Ill.; filed Dec. 9, 1944; for adhesive rubber cement; since July 10, 1942.

477,676. Wesco Waterpaints, Inc., Berkeley, Calif.; filed Dec. 16, 1944; for paints; since Nov. 15, 1944.

477,877. General Aniline & Film Corp., N. Y.; filed Dec. 23, 1944; for photographic material; since November 1944.

478,194. Titeflex, Inc., Newark, N. J.; filed Jan. 3, 1945; for filters; since Feb. 14, 1944.

Trademarks reproduced and described include those appearing in Official Gazette of U. S. Patent Office, Feb. 20 to Mar. 13, 1945.

Para-Plastic
412,463

RAP-ID-SEAL
412,495

Porphyrol
455,833

ELCO "22" GEAR SAFETY
466,984

KEMIDOL
467,627

VELOFOAM
468,241

CORAD
468,439

SYN-TEX
468,599

DOW-FROST
469,191

GEAR SAFETY No. 26
ELCO
469,752

SOWASIL
470,867

FIREMASTER
471,788

TRANSLITE
472,188

Puraflow
472,494

STIFLEX
472,510

DU PONT
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PHILCO
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QUAKESTER
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AERO-TITRATER
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ENSIS COMPOUND
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Twenty-five years of impressive growth and progress are reflected in these lake-front scenes of Chicago in 1920 and in 1945. The contrast emphasizes the sweeping changes this swift-moving quarter of a century has brought—not only to urban America but to business and industrial America as well.

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